the OIL AND GAS JOURNAL

Vessels need not be elevated or pits excavated to secure added net positive suction head

a series of Byron Jack-
Pumps used by Cities
ompany, Lake Charles,
ding, charging, extract-
rning and transferring
butane and butadiene.

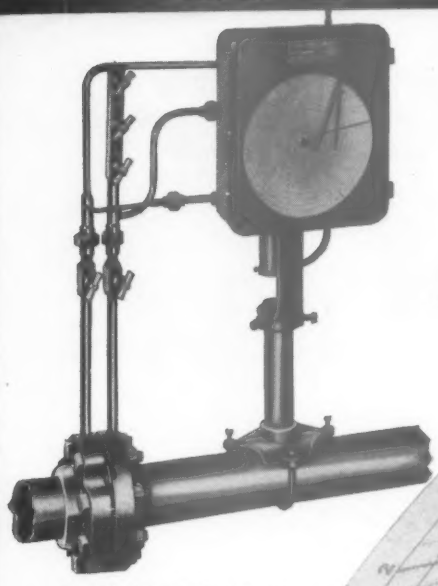
When pumping light hydrocarbons, added costs, frequently necessary to provide sufficient npsh, either by raising the vessel or providing an elaborate pit to lower the pump, may be eliminated by the use of the Byron Jackson VMT Pump. This pump consists of a multi-stage pumping unit mounted in a barrel from which it takes suction. Base of the pump is at surface level, while the length of the barrel below is determined by the npsh requirement. This arrangement permits setting suction vessel at a lower elevation. Pumps have been standardized in four sizes with 8, 10, 12 and 14 inch barrels. These cover capacities to 1000 gpm, against heads up to 250 psi, and with standard materials are applicable for temperatures to 250° F. Larger sizes can be furnished to 5000 gpm, and all sizes with suitable materials for corrosive liquids and/or temperatures to 750° F. on special order. Write for new VMT Pump Bulletin.

ARMY E NAVY

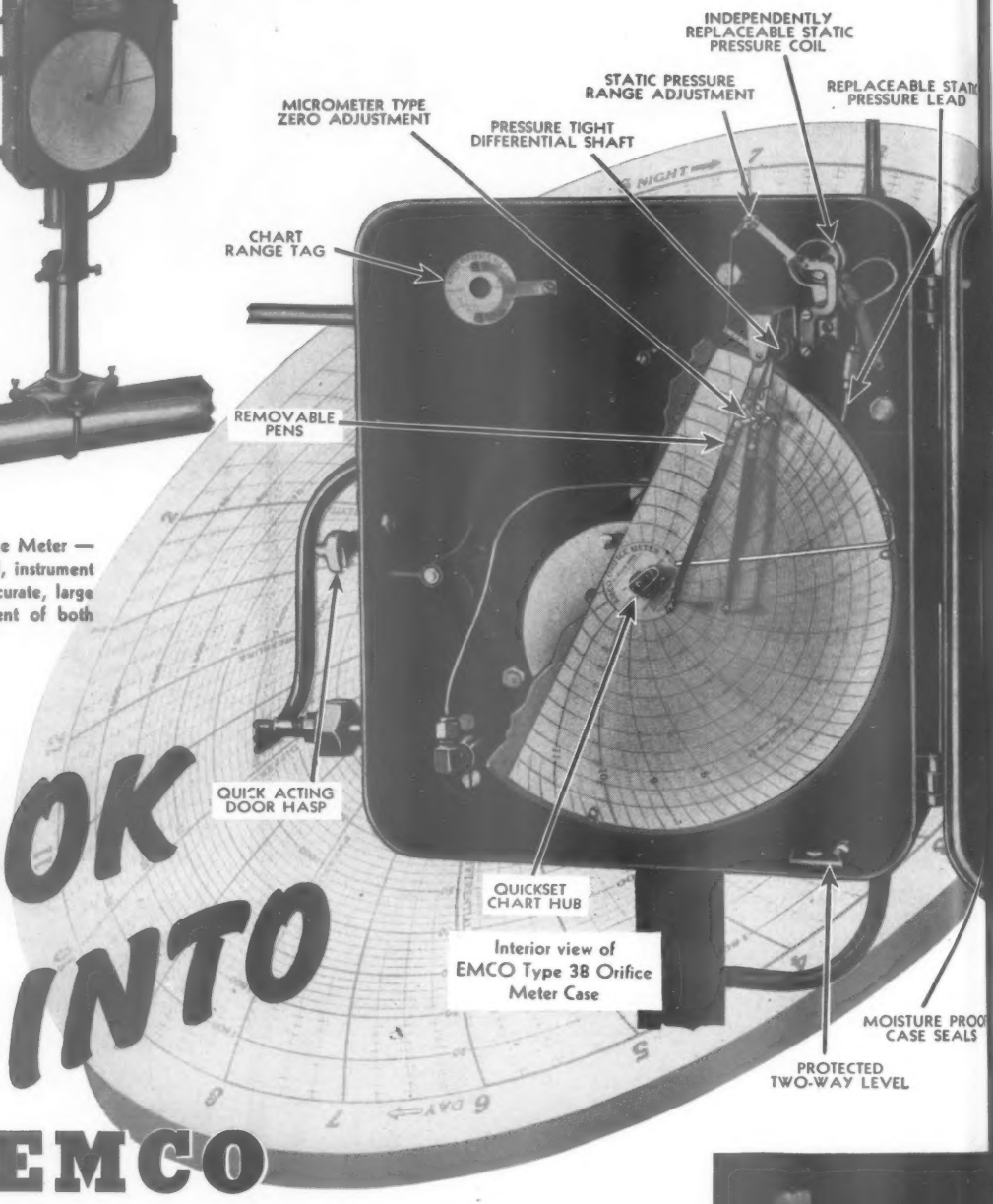
BYRON JACKSON CO.

louston • LOS ANGELES • New York

PRICE 20 CENTS OCTOBER 21, 1944



The EMCO Orifice Meter — a compact, rugged, instrument style meter for accurate, large volume measurement of both liquids and gases.



Interior view of EMCO Type 38 Orifice Meter Case

LOOK INTO

THE EMCO *type 38 ORIFICE METER*

The combination of EMCO Orifice Meters in the field or plant, with the EMCO-McGAUGHY Integrator in the office, provides the ultimate in accuracy and convenience in measurement by the orifice principle.

EMCO Orifice Meters embody many outstanding design features that result in accurate and dependable measurement of both liquids and gases. They are mechanically *right* in that the precision recording of static and differential pressures results from a sturdy, rugged construction that experience has proved necessary for instruments of this type. Periodic inspection and service can be done quickly and efficiently—the entire meter can be dismantled or assembled with a 6" Crescent wrench and screw driver. Interchangeable chambers, exclusive with the EMCO Meter, permit ready adaption to varying field requirements. Write for Bulletin 1050.

PITTSBURGH EQUITABLE METER CO.

Atlanta, Brooklyn, Chicago, New York — **MERCO NORDSTROM VALVE CO.** Main Offices, PITTSBURGH, PA. — Pittsburgh, Houston, Kansas City, Los Angeles, San Francisco, Seattle, Tulsa, Boston, Buffalo

National Meter Division, Brooklyn, N. Y.

The EMCO-McGAUGHY Integrator
Provides machine precision in reading flow meter charts of various makes. One EMCO-McGAUGHY Integrator will do the work of a number of chart readers using the inspection method; read the charts with much greater accuracy, and release this personnel for more important war-time duties.

DESIGNED BY AND FOR PRACTICAL FIELD MEASUREMENT MEN

The OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1944, by The Petroleum Publishing Co.

Vol. 43, No. 24 October 21, 1944

P. C. LAUINGER, *President* — C. O. WILLSON, *Editor*

S. H. ROURKE, *Business Manager* — H. STANLEY NORMAN, *Managing Editor*

R. C. MAC DOUGALL, *Circulation Manager* — ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor* — PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS — NEIL WILLIAMS

CHARLES J. DEEGAN — KENNETH B. BARNES

R. B. TUTTLE

District Editors

JAMES McINTYRE, Tulsa 1, 211 S. Cheyenne Ave. — THOMAS F. SMILEY, Tulsa 1, 211 S. Cheyenne Ave.

TOLBERT R. INGRAM, Denver 2, State Office Bldg. — E. H. SHORT, JR., Houston 2, Sterling Bldg.

HENRY D. RALPH, Washington 4, Natl. Press Bldg. — L. P. STOCKMAN, Los Angeles 14, Union Oil Bldg.

A. C. MacINTYRE, Oil City, Derrick Bldg. — O. C. PRESSPRICH, Saginaw, News Bldg.

VICTOR LAURISTON, Chatham, Ont., 35 Stanley Ave.

Advertising

E. KLAPPENBACH, *Vice President*

KENNETH J. LANGLEY, *Eastern Manager*, New York 17, 415 Lexington Ave. — CRAIG ESPY, *Pittsburgh Manager*, Pittsburgh 19, Grant Bldg.

C. R. FARMER, *Chicago Manager*, Chicago 2, 105 W. Madison — J. HOWARD TINKHAM, *California Manager*, Los Angeles 15, 1406 S. Grand Ave.

WAYNE RIVES, *Gulf Coast Manager*, Houston 2, Sterling Bldg. — A. J. CHAMBERS, Beckenham, Kent, England, 33, The Avenue

MITCHELL TUCKER, *Manager, Research Dept.*, Tulsa 1, 211 S. Cheyenne Ave. — JOHN D REILLY, *Production Manager*, Tulsa 1, 211 S. Cheyenne Ave.

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

PAW Studies Supply and Demand Picture as of V-E Day 82
PAW Operating Below Budget 82
No Great Reconversion of Job Problems Visualized by Boyd 83
Tropical Oil Concession Extended 83
Bedford Named Executive Vice President, Standard of Jersey 83
Standard of California Breaks World's Deep-Drilling Record 86
Early Decision Due in Memphis Gas Case 87
House Committee Urges Oil Price Increase 88
What Others Say 88
Independents Ask Return of Oil Control to States 90
Stripper-Well Operators Outline Program 90
C.N.G.A. Reviews Wartime Accomplishments of the Industry 93

Trends 81
This Week 85
Editorial 89
Deaths 94
Refinery News 143
Natural-Gas News 146
Cycling News 146
Pipe-Line News 150

ENGINEERING AND OPERATING

Dredging Canals for Servicing Fields in Marshy Areas 95
C. N. G. A. Abstracts 97
Core Analysis: Methods and Applications—A Summary 98
Choke Control of Gulf Coast Wells 105
Wilshire Concentrates Refinery and Stabilizer Gases 109
Additions to Richfield's Watson Refinery Double Output 110
Associated Refinery Draws Stocks From Eight Refineries 114
Progress in Metals 131
Practical Refinery Engineering—No. 17—Factors in Design and Operation of Heat Exchangers 135

Books 128
New Equipment 133
The Refiner's Notebook 137
Eng. Fundamentals 139

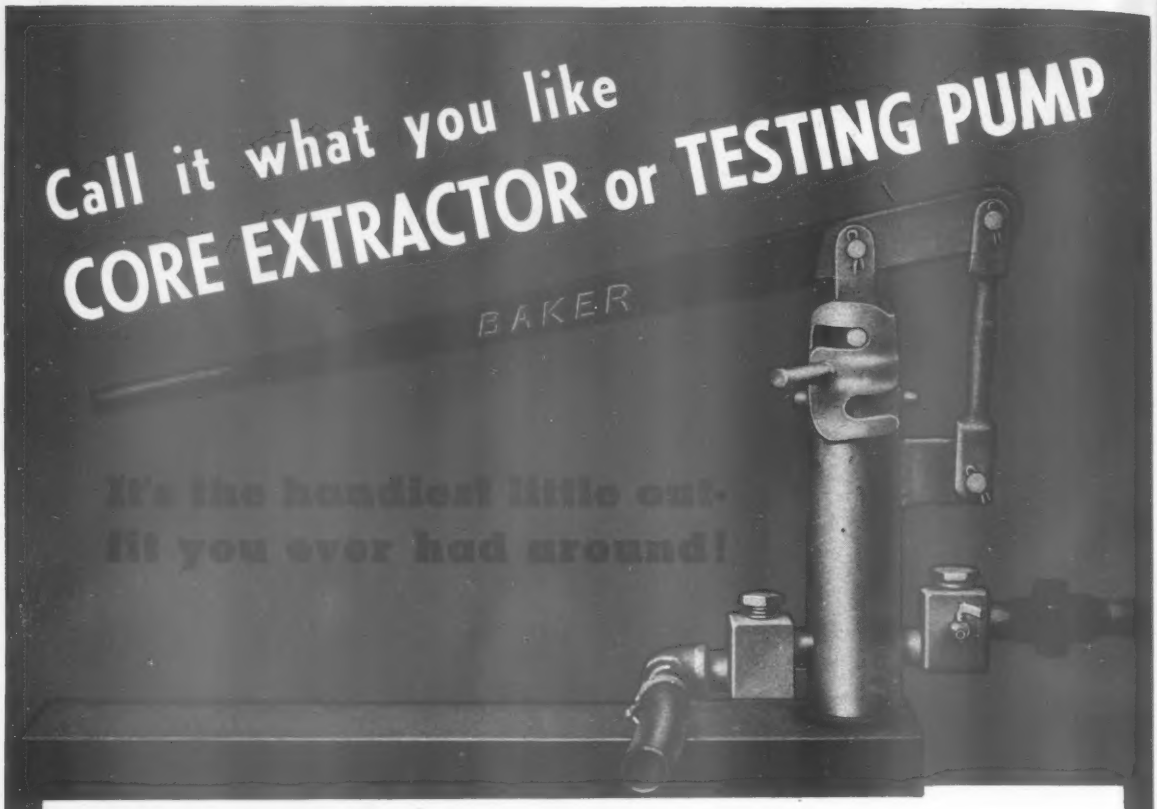
EXPLORATION AND DRILLING

Week's Highlights 155
Completions in All Areas 155
Daily Average Production for Week 156
Reports by Areas Start on Page 156
Wildcat Completions and Discoveries 171

ADDITIONAL FEATURES

Drilling Contractors 172
Market Summary 173
Crude-Oil Prices 173
Personals 174
Calendar of Events 175
Industrial Items 176
Classified Advertising 177
Index to Advertisers 180

Call it what you like
CORE EXTRACTOR or TESTING PUMP



It has dozens of uses in both field and shop

The Baker Hydraulic Core Extractor and Testing Pump is a strong, simply constructed light-weight unit capable of developing pressures up to 6,000 pounds, without undue exertion.

Originally designed for removing cores from core barrels, many other oil field and shop uses have been discovered and it is today widely used as a testing pump; for removing plungers from insert liner oil well pumps; for testing valves, fittings, casing and tubing; and for setting Baker Cement Retainers when mud or cement pumps are not available.

LOW OR HIGH PRESSURE

The Baker Hydraulic Core Extractor has two pistons, one for low pressures and one for high pressures, the change being quickly made by merely moving the pressure shifter to engage the proper lugs for pressure desired.

LASTS INDEFINITELY WITHOUT REPAIRS

Simple, rugged construction insures long, trouble-free service, and by pumping clear water (or water containing soluble oil) through the unit after use, the essential working parts always function properly and seldom require replacement.

The Baker Hydraulic Core Extractor and Testing Pump is identified as Product No. 540, and is described in detail on Page 374 of the 1944 Baker (or Composite) Catalog.

BAKER OIL TOOLS, INC.

Houston—LOS ANGELES—New York

The BAKER Hydraulic

CORE EXTRACTOR AND TESTING PUMP PRODUCT NO. 540

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production By States—Page 156

CRUDE-OIL STOCKS 222,500,000 bbl. as of October 7—up 110,000 bbl. One year ago 233,471,000 bbl.

GASOLINE STOCKS 78,554,000 bbl. as of October 7—up 526,000 bbl. One year ago 69,014,000 bbl.

RESIDUAL FUEL-OIL STOCKS 64,644,000 bbl. as of October 7—up 418,000 bbl. One year ago 66,883,000 bbl.

GAS OIL AND DISTILLATE STOCKS 46,078,000 bbl. as of October 7—up 749,000 bbl. One year ago 40,513,000 bbl.

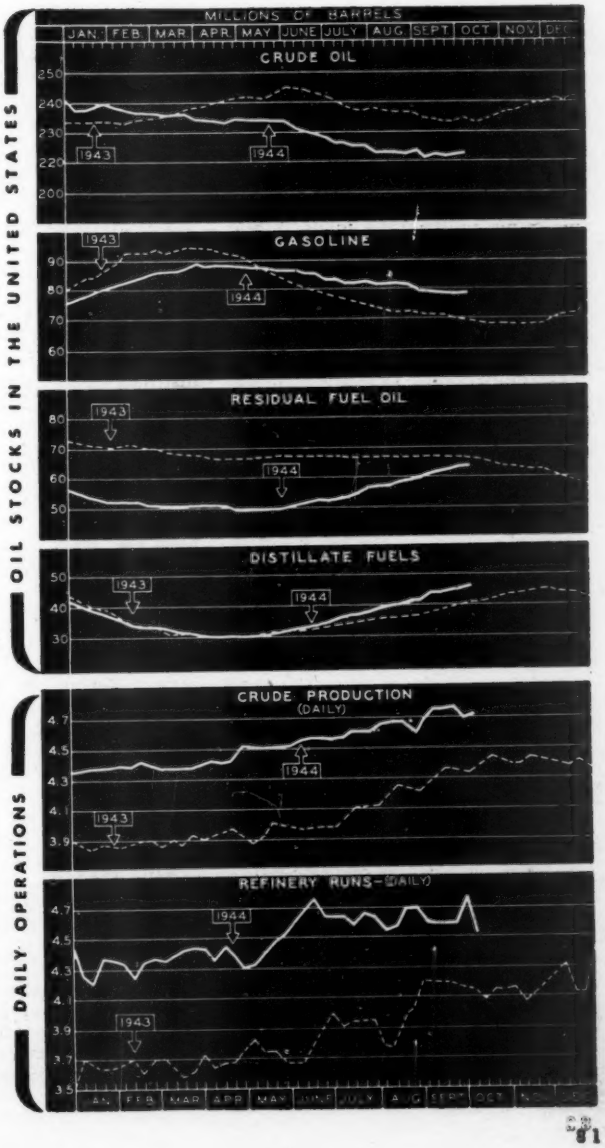
CRUDE-OIL PRODUCTION 4,721,650 bbl. as of October 14—up 24,300 bbl. One year ago 4,438,035 bbl.

REFINERY RUNS 4,506,000 bbl. daily week ended October 7—down 269,000 bbl. Year ago 4,115,000 bbl.

EMPHASIS on sweet crude-oil production was restored this week in the Petroleum Administration for War's preliminary declaration on November requirements. This trend was pointed out in PAW's statement of crude-oil demand from Texas which is customarily released several days before the national quotas are completed in order to accommodate mid-month deliberations of the Texas Railroad Commission. Crude oil demand from West Texas next month will be 22,000 bbl. per day below the October declaration. But PAW expressed need for exactly an equivalent amount of sweet crude in the vicinity of the WEP southern terminal at Longview. The desire to increase sweet-crude deliveries on the East Coast appears to be tied in with the switch to higher quality aviation fuels and to transportation changes which call for greater use of tank cars for oil shipments from the interior to California.

THE current arrangement of Texas' pipe-line facilities will permit withdrawal of this 22,000-bbl. supply from numerous fields for transportation from the Gulf Coast north to Longview but it is probable that the bulk will come from the East Texas field. Prospects are that another critical situation will develop in the East Texas field pressure decline unless the PAW call for additional sweet crude oil is spread over the several fields with moderate reserve productive capacity. Such shifts, however, threaten to interrupt the regular flow of sweet crude to the Gulf Coast refineries and thus interfere with manufacture of war products. The situation is made more critical by withdrawals exceeding optimum rates from sweet-oil fields over the entire war period. Discoveries throughout the southeastern part of Texas have been comparatively sparse.

ON the other hand, West Texas discoveries have been relatively high for the past 4 or 5 years. Development drilling has been increased in the sour-oil territory in order to supply new outlets running to the Middle West refining centers. Part of the West Texas operators' efforts will be nullified for the duration or until another shift develops in supply requirements. Diminished demand for West Texas crude also reflects the continued increase in Oklahoma's West Edmond field production which is doing much to reduce charging-stock deficiencies in PAW District 2.



PAW Studies Supply and Demand Picture as of V-E Day; Avoids Postwar Planning

by Henry D. Ralph

WASHINGTON. — The probable supply and demand of petroleum after the end of the war in Europe is now being studied by Petroleum Administration for War in order to be prepared for better prosecution of the war with Japan, but PAW is scrupulously avoiding any postwar planning and will make no estimates beyond 1945.

A British program committee is currently making one of its periodic visits to Washington to map out supply problems for the winter with PAW, and alternate estimates are being drawn up for the first quarter of 1945, one assuming that the war will continue until spring and one assuming it has ended by the close of this calendar year. These programs will not be made public, but necessary operating data probably will be conveyed to the industry through Petroleum Industry War Council.

The general opinion is that there will be very little reduction in the total demand for petroleum in this country after V-E Day (victory in Europe), except possibly during a short period of readjustment. Aviation-gasoline requirements may fall off some while air power is being shifted from Europe to the Pacific theater, and this will permit refineries to place greater emphasis on increased quality at the expense of quantity with the result that some more gasoline base stock may become available for civilian-grade motor fuel.

Consumption During Pacific War

Military consumption of motor gasoline during the Pacific war is a matter of conjecture, but unless there is extensive land fighting by mass armies it is probable that the requirements will be somewhat less than at present. Informed guessers are of the opinion that, considering various factors, there may be around 300,000 bbl. daily more gasoline available for civilian consumption than at present.

The current allocation of automotive gasoline for United States civilian consumption is 1,173,000 bbl. daily, of which 560,000 goes to passenger automobiles. Assuming that buses, trucks, agriculture and industrial uses are currently being satisfied and would have their allocations increased very little, the possible 300,000-bbl. increased supply would go mostly to passenger cars, with "B" cards getting the first call and the remainder going to increase "A" card rations. This would permit an increase of around 50 per cent in passenger-car mileage, and there is no doubt but that such an additional quantity of gasoline would readily be consumed. There has been some discussion that the Office of Defense Transportation might oppose an increase in passenger-car rations to prevent cars from wearing out, but the general opinion is that this will not be done. For one thing, the passenger-car tire supply should be adequate by the first of next year, and if both gasoline and tires are available the popular pressure for higher rations would be too strong to oppose successfully.

Military and civilian demands for distillate fuel oils probably will continue to absorb the supply, as domestic-heating rations will be lifted as soon as possible.

The only product which may be in oversupply after V-E day is residual fuel oil. Shipping demands will show little or no decrease as long as the Pacific war continues, but an over-all cutback of some 40 per cent in war-production contracts may make a proportionate reduction in industrial-fuel consumption.

Some of this may be offset by reconversion of industry to production of civilian goods, but the reconversion process may be slow and limited by availability of manpower in some areas. Stocks of residuals are currently higher, relatively speaking, than other petroleum products, and may continue to climb. It will be impossible for most refiners to decrease their yields of residuals without affecting their production of petroleum war products, particularly aviation gasoline.

Possible Caribbean Cutback

One possible solution would be to cut back the production of heavy crudes in the Caribbean region, since they yield such a high percentage of residual fuel oil. This, however, would require considerable shifting in both domestic and Caribbean operations in order to maintain the war oil program.

There is general agreement that if the war in Europe continues throughout the winter, the United Nations will have difficulty meeting military demands for petroleum products. If V-E day comes in the relatively near future there should be considerable easing of supply, but not enough to mean any curtailment in United States oil operations. Military requirements for the Pacific war, as currently estimated, are very high, and unless these should be revised downward as the result of further study or experience there is little prospect for an appreciable drop in over-all demand until the end of the war with Japan.

PAW Operating Below Budget

WASHINGTON. — Petroleum Administration for War was able to operate substantially below its budget during the first quarter of the fiscal year, Ralph K. Davies, deputy petroleum administrator, says. At its current level of operation PAW will turn back approximately $700,000 of its appropriation to the Treasury at the end of the fiscal year. Last May it voluntarily reduced its budget request approximately $500,000. Operating on an annual budget of $6,000,000, PAW expenditures for the first 3 months were $1,317,213, or $182,787 under budget.

"In PAW we are not waiting for the termination of war to begin reduction of our staff," said Davies. "We must, of course, maintain always the organization and personnel necessary to do a first-rate job but it is our purpose to operate with the greatest possible economy.

"It has been possible to reduce the production division staff from 154 to 106. The 100-octane project and other building programs are nearing completion and as a result the construction division has been reduced from 96 to 58 employes. Through elimination of the asphalt section and relaxation of regulations the marketing and distribution division has reduced its staff from 253 to 154. In all, it has been possible to reduce the PAW staff from a high of 1,438 persons in July 1943 to 1,156 employes as of the end of September 1944—a cut of 20 per cent. This represents a cut in the staff of the Washington office from 908 to 746, and in the field from 530 to 410.

No Great Reconversion or Job Problems Visualized by Boyd

INDIANAPOLIS. — No great problems in either physical reconversion or postwar jobs face the oil industry, according to William R. Boyd, Jr., chairman of Petroleum Industry War Council. Boyd, who is also chairman of the industry's national war agency created by Petroleum Administration for War, said in an address before Indiana Independent Petroleum Association here last week:

"The petroleum industry is fortunate in that it faces no great physical reconversion problem. Crude oil, undergoing the same basic processing, will produce for peace as well as for war. There will be shifts in emphasis, of course, shifts from large quantities of 100-octane gasoline to smaller quantities of 100-octane-plus gasoline at the end of the war in Europe.

"There will be a heavier load on the West Coast refineries after V-E Day, and a diminished demand on the East Coast. In the over-all picture, however, the oil industry faces no great problem of retooling. It will not have to stop the manufacture of one product and turn to some entirely different product. Fuels and lubricants will continue to be the mainstays of our industry, whether they are used in tanks, tractors, B-29's or passenger cars or airliners.

"This subject of postwar jobs is one in which the petroleum industry must not and will not be found wanting. Many a weary warrior in the foxholes of France, the ruined villages of Italy and the eternal mud of New Guinea has often thought confidently of the oil job he is coming back to."

Boyd predicted that new products, new outlets, new uses, new concepts of service will provide more jobs and more opportunities in the petroleum industry, and greater peacetime usefulness.

"There is one reconversion problem, however, which may well engage the careful attention of us all," Boyd emphasized. "That is the problem of mental reconversion; the readjustment of our thinking and retooling our business methods from war to peace. American alertness and American initiative built the petroleum industry to a position far in advance of that of any other nation. It is a matter of utmost importance that we be prepared to go ahead full throttle as soon as the exigencies of war permit."

Tropical Oil Concession Extended

BOGOTA.—Tropical Oil Co.'s concession in this republic, long a subject of controversy, has been extended to August 25, 1951, by decree of the Colombian supreme court. The concession would have expired in 1946. Tropical is a subsidiary of International Petroleum Co., Ltd., which in turn is a subsidiary of Imperial Oil, Ltd., an affiliate of Standard Oil Co. (New Jersey.) The decision is expected to stimulate other American firms in making Colombia a scene of operations.

When Tropical's concession does terminate, the fields it has developed along with a refinery, tank farm, pipe lines, material yards and oil wells, will become the property of Colombia.

Tropical is expected now to pursue orderly development of its properties, seek additional reserves, and be in a position to negotiate before 1951 for the right to operate the properties for the Colombian Government.

In 1905 Dr. Roberto de Maras applied for a concession on the reserve now called Barranca Bermeja, but legal delays and investigation caused delays and it was 1919 before his title was declared good, and when he sought to transfer the concession to Justo M. de la Espriella, who in turn was selling it to Tropical, the Colombian Government intervened and imposed certain conditions.

These conditions, which Tropical accepted, called for the building of a refinery, the first in Colombia, so the needs of the country would be served as exploration continued. The court apparently took into consideration these additional requirements and the delay in obtaining materials and so unanimously ruled that the delays entitled Tropical to extension of its 30-year concession.

ODT Imposes Restrictions On Use of Tank Cars

WASHINGTON.—An order issued last week by Office of Defense Transportation prohibits use of tank cars of less than 7,000 gal. capacity, except by permit, for shipment of oil products into District 1 (Atlantic seaboard area) and of all liquid products to the Pacific Coast.

So far as the eastern seaboard area is concerned, the new order restores one formerly in effect. The direction affecting the West Coast is necessary, said Fayette B. Dow, director of the ODT Department of Liquid Transport, to relieve the congested West Coast terminals, and to move a maximum quantity of products with a minimum number of tank cars.

A.C.S. Deliberating on Gift Offer of U.O.P.

WASHINGTON. — The American Chemical Society has not yet made any decision regarding the offer of Universal Oil Products Co. to convey its research organization to the society. The proposal is being carefully examined by legal counsel for A.C.S., and it is not known when an opinion will be made. The matter probably will be decided at the December meeting of the A.C.S. directors.

Bedford Named Executive Vice President for Standard Oil Co. of New Jersey

NEW YORK.—A. Clarke Bedford has been elected executive vice president of Standard Oil Co. of New Jersey. Since January 1, 1943, he has been general sales manager of the company and its affiliates, which post he took over following several years' service as assistant sales manager. He has been engaged in sales work since 1920, when he was made a member of the marketing committee of the Jersey company. Prior to that, and following his graduation from Williams College in 1913, he had been engaged in refining, accounting, and production work for various company interests.

He served with Carter Oil Co. as secretary and assistant treasurer before joining the Jersey company marketing committee. In 1926 he became joint manager of the domestic sales department and in 1927 went to New Orleans as a vice president and director of Standard Oil Co. of Louisiana. Four years later he went to Boston as president of Colonial Beacon Oil Co. and in 1933 returned to New York as sales coordinator, continuing as president of Colonial Beacon.

"Superfuel" for Fighting Planes Ready for Use

WASHINGTON. — What is described as a "superfuel" for fighting planes on the flattops and for such craft as the B-29, is now ready for the armed forces of the Allies as soon as the military authorities give the word, according to Ralph K. Davies, deputy petroleum administrator. The new fuel, developed by technologists of the oil industry, will give planes greater cruising range and greater full-throttle performance, Davies said. Only minor changes in processing technique will be required to begin producing the fuel.

"At the present time, the United Nations are manufacturing about 500,000 bbl. a day of 100-octane aviation gasoline," Davies said. "This month, for the first time since the war began, our production of 100-octane gasoline will exceed requirements both for combat and training purposes. When the superfuel goes into production, the total output will drop materially because a barrel of crude oil will produce only about half as much of the new superfuel as it will of the grade of 100-octane aviation gasoline now in manufacture."

Davies pointed out, however, that United States refineries probably would not go all out in their production of the new fuel, but rather would make only enough to fill the requirements of equipment such as carrier-based planes and the new big bombers.

The effect of the new fuel will be to give United Nations' planes even greater superiority over the Japanese air fleets, the deputy administrator said. Greater cruising range will be particularly advantageous to carrier-based fighters and bombers, while increased full-throttle performance will give fighter planes greater maneuverability and permit the bombers to take off with heavier loads.

"More gasoline is being burned in the United Nations' planes every day than is available presently for passenger car use," Davies added. "The high-quality ingredients of the phenomenal fuel that now can be manufactured must be made from petroleum gases by synthetic chemical processes or extracted by elaborate distillation methods from other available petroleum materials."

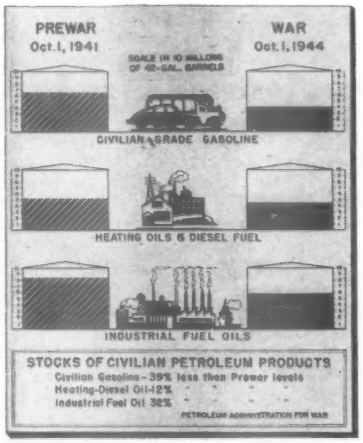
Making of Domestic-Type Burners to Be Resumed

WASHINGTON. — Material has been authorized for production of 30,000 domestic-type oil burners during the fourth quarter of 1944, for replacement and hardship cases, War Production Board announces. Production of such burners has been prohibited since April 15, 1942. Inventories have become depleted and consumers are experiencing difficulty. WPB officials do not expect that any substantial quantity of these burners will be on sale until early in December.

Civilian Stockpile Now 29 Per Cent Less Than Prewar October Levels

WASHINGTON. — The supply of principal petroleum products available to civilians is now 29 per cent less than prewar October levels, it was declared here this week by Ralph K. Davies, deputy petroleum administrator. Davies explained that stocks of civilian-grade motor gasoline, heating oil, and industrial fuels aggregated 200,400,000 bbl. during October 1941, as compared with 142,600,000 bbl. on October 1 this year. Civilian gasoline stocks are 39 per cent less than comparable prewar levels, heating oils and diesel fuels 12 per cent less, and industrial fuels 32 per cent less than prewar October levels.

Refinery production, Davies said, of civilian-grade gasoline during September 1944 averaged 48,000 bbl. daily less than the daily average



demand of this product during the same period. Stocks of civilian-grade gasoline at refineries and terminals in the United States totaled 39,766,000 bbl. on September 30, as compared with 41,132,000 bbl. on September 2. Stocks totaled 65,240,000 bbl. on September 30, 1941.

The deputy administrator advised that average daily crude runs to refining stills during September totaled 4,638,000 bbl. This is an increase of 151,500 bbl. over the average daily runs to stills during the first 8 months of 1944. Since the demand for crude oil was greater than production during September, the nation's stockpile of crude oil was reduced 621,000 bbl. during the month.

Reporting Requirements Are Eased by OPA

DALLAS.—The recent announcement by Office of Price Administration in Washington that dealers in used oil-field equipment and oil-refining machinery need not file reports during the final quarter of 1944 is in keeping with that agency's policy of easing reporting requirements wherever possible, U. R. Laves, head of the regional machinery unit here, explains in a statement.

"Suspension of the filing requirements does not mean that there will be any relaxation of price control on new or used equipment," says Laves. "Dealers and those engaged in buying and selling used machinery and machine tools are still required to register with OPA under Licensing Order 3, and it will also be necessary to continue to maintain complete inventory and sales records.

"In the past, dealers and supply companies handling used oil-field equipment and petroleum-refining machinery have been required to file sales reports on Form WPB 2574-OPA 2:10:P1. How industry maintains price control during this 90-day period will determine what action will be taken on future reporting requirements.

"Buyers and sellers, regardless of whether they are oil companies, individuals, or dealers, are governed by the provisions of Maximum Price Regulation 136, and the 90-day suspension of reporting requirements makes no changes in the ceiling prices of these items."

Refinery Workers Score 6-Year Safety Record

BATON ROUGE.—Six consecutive years without a disabling accident is the record made by the boilermakers, welders, riggers and burners at the Baton Rouge refinery of Standard Oil Co. of Louisiana. During the 6 years, according to Frank G. Clark, foreman, the men in the department worked more than 2,861,000 man-hours, regarded as a signal accomplishment considering the nature of their operations. "Our new goal is 3,000,000 man-hours," said Clark.

Earlier this year Clark received the Safety Ace Award and a $100 war bond from the National Safety Council for "outstanding safety achievements."

THIS WEEK

PRODUCTION—National daily output rises 24,300 bbl. above preceding week. . . . Kansas, Illinois, California provide the higher figures. . . . Total still 37,550 bbl. below all-time peak of 4,758,200 reached in September. . . . ¶J. H. Cable, petroleum engineer, estimates repressured wells in Texas alone have produced 50,000,000 bbl. of oil that would have been lost. . . . If crude prices justify, secondary recovery likely to yield 1,000,000,000 bbl. in Texas. . . .

NATURAL GAS—Pattern of FPC's policy concerning expansion expected to be set in decision of Memphis case. . . . Early ruling likely to follow arguments heard October 16. . . . Memphis Natural contends domestic users will suffer unless increase in supply from field is permitted. . . . ¶Dr. Schoch, University of Texas, predicts natural gas will become too valuable for use as industrial fuel. . . . Great potentialities in chemistry. . . . Foresees production of acetylene from natural gas. . . . From acetylene wide range of synthetic materials possible, including rubber. . . .

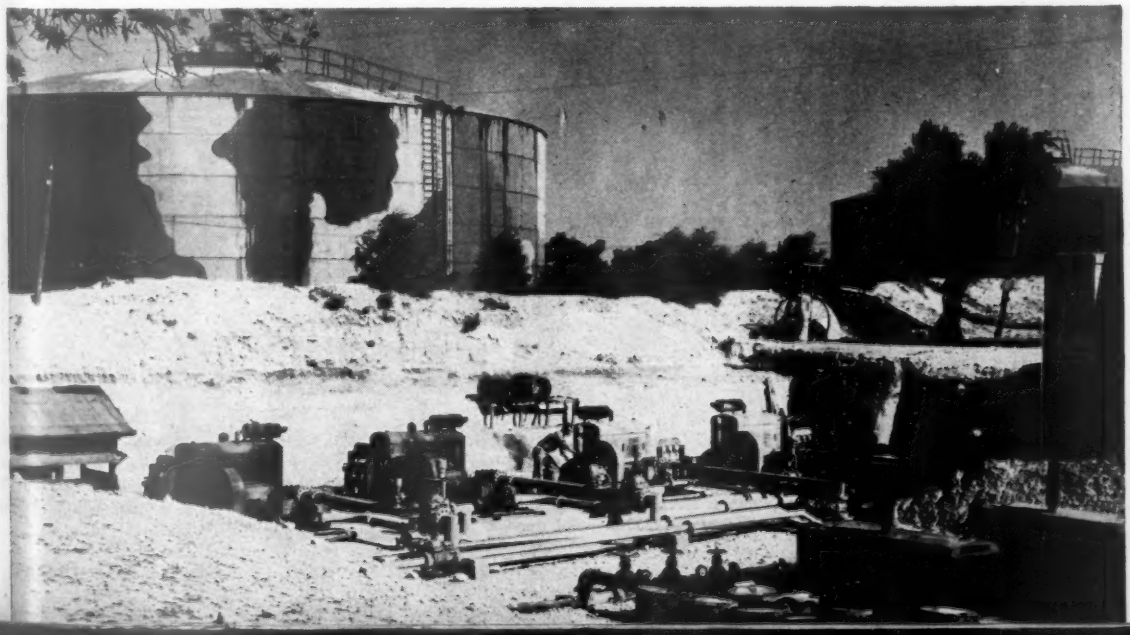
FOREIGN—Russia negotiating with Iran for oil concession. . . . Hitherto devoted energies to developing internal resources. . . . Suggests Iranian labor and Russian engineering skill could be used to advantage of both countries. . . . ¶Paraguay and Union Oil Co. of California join in cooperative project to explore and develop Gran Chaco region. . . . Agreement provides for geological and geophysical investigation, to be followed by exploratory drilling, with Paraguay taking part. . . .

REFINING—"Superfuel" announced by PAW will give Allied planes increased superiority over Japanese. . . . Developed by oil's technologists. . . . Probably use it chiefly in carrier-based planes. . . . Requires only minor changes in refinery technique. . . . ¶Pennzoil to build unit at Rouseville, Pa., for lubricating oil, using methyl-ethyl-ketone, costing $1,400,000. . . . ¶Davies warns household users of fuel oil, "Fill your tanks now." . . . Winter shortage in prospect. . . .

DRILLING—Standard of California's deep test in Kern County, California, passes 15,319 ft. and drilling ahead. . . . World's deepest hole. . . . Previous record held by Phillips Petroleum in Pecos County, Texas, 15,279 ft. . . . No footage goal set. . . . No special equipment used. . . ¶Completions in all fields total 446, decline of 54 from previous week. . . . Total completions in 1944 to date, 16,777, compared with 13,740 in same period last year. . . .

ECONOMICS—Reconversion and postwar jobs promise no serious difficulties for oil industry, William R. Boyd, Jr., chairman of PIWC, says. . . . Some shifts in emphasis inevitable, but oil produces things for peace as well as war. . . . ¶Return of regulatory powers to states immediately upon war's end demanded by I.P.A.A. . . . Declares private capital, individual initiative, free competitive enterprise always achieve highest degree of development. . . . ¶PAW studying probable oil supply and demand after end of war in Europe, with view of being better prepared for war with Japan. . . .

These terminal tanks and pumping system are part of a complete pipe-line network that has been set up somewhere in Southern Italy by an engineering company largely made up of veteran Texas and Oklahoma oil men. The terminal storage tanks are half visible, the other half is sunk beneath the surface of the earth. They were originally German installations and retain the camouflaging. Huge dirt walls have been built up around them to contain the entire 100-octane-gasoline contents should the tank explode. The pumping system in the foreground is sunk beneath the level of the earth to prevent strafing as much as possible



Standard of California Breaks World's Deep-Drilling Record

by L. P. Stockman

LOS ANGELES.—Standard Oil Co. of California this week exceeded Phillips Petroleum Co.'s drilling depth record of 15,279 ft. in 20-13 Kern Front Land at South Coles Levee in Kern County, California. Standard of California's deep test at 15,319 ft. is drilling ahead in search of deeper production and no footage has been set for suspension of drilling. This new record, surpassing that set by Phillips in Pecos County, Texas, last April, was accomplished without special equipment.

The objective of this deep well is the Vedder sand of Miocene age and drilling will be continued as long as the zone lies ahead or as long as the equipment permits. Wells at Coles Levee generally produce from the Stevens sand of Miocene age at approximately 9,000 ft. and Standard of California is seeking the Vedder which is highly productive around the edge of the San Joaquin Basin and at Rio Bravo and Greeley. If Standard succeeds in developing Vedder production in 20-13 Kern County it would be the most important exploratory development in recent California oil history.

The record-breaking test is in the west central part of 5-31s-25e, and has elevation of 488 ft. Drilling started in the record well July 31, 1943, and 14 months later the previous California deep-drilling mark of 15,004 ft. was equaled and passed. The previous record was established by Continental Oil Co. at Wasco in 1938.

Standard of California started its deep test with a 15½-in. hole and this was carried to 1,188 ft. where 11¾-in. casing was cemented. A 10⅝-in. hole was then drilled to 10,999 ft. where 7-in. casing was landed and cemented for protective purposes. From 10,999 ft. to present bottom, a 5⅞-in. hole has been drilled. Currently, 3½-in. drill pipe is being used and it is significant to note that it is not all new pipe. Frequent checks have been made and at no time has the hole been more than 3° off vertical.

The company is using a 136-ft. steel derrick, 360-ton crown block, 18-in. by 8-in. by 20-in. mud pump and a 16¼-in. by 7¾-in. by 20-in. mud pump, 11-in. by 11-in. twin engine as well as a complete shutoff gate and blowout preventer.

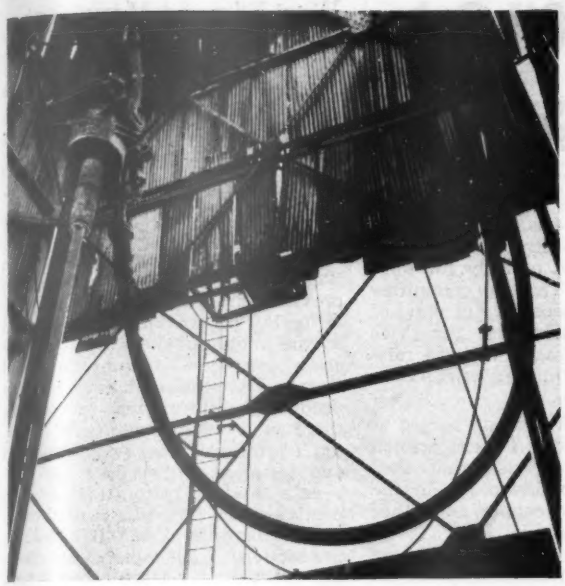
Mud Weight Increased

The mud weight has been increased from the range of 78 to 80 lb. in the upper part of the hole to 90 and 93 lb. at present depth.

The crew makes a round trip, when changing bits, in a little less than 8 hours. Approximately 3½ hours are required to come out of the hole and about 4 hours to go back in handling over one hundred sixty-five 90-ft. stands of drill pipe.

So far, 548 bits have been used

Top, left: Approximately 3½ hours are required to come out of the hole and about 4 hours to go back in handling over one hundred sixty-five 90-ft. stands of drill pipe. Botton: Rack of more than 15,100 ft. of drill pipe. The man is A. R. Keeler, rotary helper. Right: General view of the 136-ft. steel derrick, which has a 360-ton crown block



Above, left: Swivel and mud hose. Mud weight has been increased from 78 to 80 lb. in the upper part of the hole to 90 and 93 lb. at present depth. Above, right: P. C. Farlow, derrickman, and Omar Cavins, assistant general superintendent, northern district, producing department, testing mud weight. Right: D. E. Behymer, rotary helper, servicing the twin engine

and it is estimated the total weight of the drill pipe and accessory equipment, supported by the derrick, approximate 250,000 lb. No serious fishing jobs have been encountered.

Al Tietze, general superintendent for Standard of California's northern district, is in charge of operations. The drilling record since passing 14,000 ft. by weeks follows:

Week ending—	Depth in feet	Footage drilled
June 29	14,073	...
July 5	14,170	97
July 12	14,300	130
July 19	14,425	125
July 25	14,492	67
August 1	14,632	140
August 9	14,711	79
August 15	14,810	99
August 22	14,824	14
August 29	14,843	19
September 6	14,875	32
September 12	14,900	25
September 19	14,943	43
September 27	14,979	36
October 3	15,037	58
October 10	15,159	122
October 16	15,300	...

Early Decision Due in Memphis Gas Case

WASHINGTON.—An early decision is expected from the Federal Power Commission in the important Memphis Natural Gas Co. case as a result of expedited oral argument heard by the commission October 16.

The proceeding is a reconsideration of the FPC decision of last June denying the company approval to increase its pipe-line capacity to supply additional gas to Memphis, Tenn., from the Monroe field in Louisiana. The decision on reconsideration may set long-range policy regarding expansion of the natural-gas industry. The June decision, the first of its kind, denied the application on the grounds that reserves in the Monroe field are declining and on the assumption that gas is used in Memphis for firing boilers and other so-called inferior uses.

Voluminous additional evidence was taken during 25 days of hearings starting September 7 in Memphis, after which oral argument was scheduled immediately, the commission dispensing with the usual filing of briefs, indicating that an early decision is in prospect.

Attorneys at the oral argument were so limited as to time that they could only summarize their positions briefly. The company has amended its application to include lines to other Louisiana fields and contends this will assure ample reserves for many years. The city of Memphis denied that natural gas is used for inferior uses beyond certain industrial customers who take gas during off-peak seasons, and it contended a certain number of such customers are necessary to maintain a system adequate to supply domestic users at peak seasons.

Opposition came from the State of Louisiana which argues against exportation of gas, particularly for industrial uses, and from coal interests who desire natural-gas sales confined to domestic uses.

House Committee Urges Oil Price Increase, Stripper-Well Subsidy

WASHINGTON. — Charging that the present stripper-well subsidy program is inadequate, the House committee on small business late last week urged an immediate increase of 35 cents a barrel in crude-oil prices, subsidy payments for stripper wells, and subsidies to refineries which cannot absorb the price increase.

Following recent hearings in Austin, the committee made unanimous recommendations in a conference with Fred M. Vinson, director of the Office of Economic Stabilization.

In a report to Judge Vinson, Chairman Wright Patman of Texas urged immediate favorable action "because the plight of the independent oil producer is a deplorable one and because he will be forced out of business, leaving the field entirely to the majors and to those concerns using excess profits from unrelated businesses unless immediate relief is granted."

Patman referred to his committee's May 10, 1943, endorsement of a Petroleum Administration for War recommendation of the 35-cents a barrel price increase.

"This recommendation was not acted on favorably. Instead, in July of this year, a subsidy program was put into effect which furnishes only partial relief to operators of certain wells in certain areas of low average production."

Subsequent events, he said, have demonstrated the validity of the recommendation, and, in the opinion of the committee, the nation would have been better prepared today if it had been adopted.

Summarizing the Austin hearings, Patman said testimony clearly indicated that the existing subsidy program does not furnish sufficient financial relief to the majority of independent producers to encourage them to stay in business. The recent PAW certification, Patman declared, will decrease "materially" the production rate for October, and enhance the existing plight of independent operators.

The committee's specific recommendations follow:

1. An immediate establishment of the 35-cent per barrel crude-oil price increase.

2. Subsidies, for certain stripper wells, since the 35-cent increase will not be sufficient to assure continued production.

3. Payment of subsidies where necessary to independent refineries whose operations are evidenced by high operating costs, by an absence of government contracts, and whose products are sold entirely for public consumption. This, the committee said, would be necessary in view of its recommendation that the price of crude be increased without raising the cost of finished products to the consumer.

The committee went on record as opposed to subsidies for exploration purposes, but suggested that they may be used to advantage in the oil business as in copper and other mining industries.

Judge Vinson told the committee he would take the recommendations under advisement and would give the testimony of the Austin hearings and the committee's recommendations careful consideration.

West Edmond Movement Resumed After Fire

OKLAHOMA CITY.—Destruction of the Banks station of the Cimarron Valley Pipe Line Co.'s facilities furnishing the only outlet from the West Edmond field, October 15, impeded movement of crude oil only temporarily.

Pumping equipment was rushed to West Edmond from other areas to provide ample capacity for moving all of the production from the field by the middle of the week. In many cases producers found that field storage was sufficient to hold crude produced at the normal rate during the 2 days while emergency pumping equipment was being procured and installed.

As a result of restoration of transportation, the pipe line is now capable of handling the full allowable production of 200 bbl. daily. There has been no need for cutting back production except for leases which lacked adequate field storage for meeting the temporary emergency immediately following the fire.

What Others Say

Fischer-Tropsch Prospects

New York, N. Y.

Dear Sirs:

The series of articles on the Fischer-Tropsch process by Mr. Foster have been reviewed with considerable interest. In our opinion this process, suitably modified in operating conditions, catalyst and process equipment through research and development work now in progress, will become an important factor in the post-war picture. Although modifications of the process have been developed to result in the direct production of high octane number gasoline, I am sure you are aware of the considerable interest in the high cetane diesel fuel which can be produced in good yield from the more conventional operation. The high melting point waxes have, of course, a wide range of existing and potential uses and even the low-octane gasoline may find important uses other than as fuel for internal-combustion engines.

Although the general attitude toward the Fischer-Tropsch process and other similar processes is that they will not reach the stage of commercial use until after the end of the present war, it is our opinion that active work must be conducted on such processes now in order to insure an adequate supply of petroleum products for the United States at any time in the future. This view seems amply sustained by the current interest and activity in this field.

Yours very truly,
W. E. KUHN.
Manager, Technical and Research Division
The Texas Co.

Methane Synthesis

Dallas, Tex.

Dear Sirs:

I am of the opinion that the synthesis of methane from natural gas by the Fischer-Tropsch process will play an important part in the production of both motor fuel and lubricants in the future and believe that researchers now working on this theory will develop improvements which will ultimately simplify the apparatus which eventually will make it competitive with the present catalytic processes for the production of motor fuels.

Yours very truly,
SOUTHPORT PETROLEUM CO. OF DELAWARE.
E. Geppelt, Jr., vice president.

Black-Oil Producers Aided

Denver, Colo.

Dear Sirs:

The information and encouragement supplied by your article "Black Oil Producers See Early Solution of Marketing Problem" on page 52 of the September 30 Journal should be very gratifying to the operators in the Rocky Mountain district, particularly to those who for years have insisted that the reserves of high-sulfur content oils of Wyoming were of prime importance.

The fields developed to date in that area are located in general around the edges of the basins, but it is commonly believed that many additional and perhaps larger and more prolific fields will be developed within the basins themselves. Should this latter expectancy be proved, the present pipe line completions will be only the beginning.

Yours very truly,
J. A. WARREN.
Kinney-Coastal Oil Co.

Comprehensive Report

Bartlesville, Okla.

Dear Sirs:

In our opinion, Mr. Foster has given a very comprehensive survey of the Fischer-Tropsch process. At the present time, we have nothing to add to this excellent discussion of the subject.

Yours very truly,
G. G. OBERFELL.
Vice president, Phillips Petroleum Co.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Importance of Price

WHAT'S the price for crude oil to be after the war? What will be the price relationship between fuel oil and gasoline?

These and many allied questions are asked by managements as they attempt to project their operations starting with the war's end. Inevitably all postwar planning comes to the point where decisions have to be made in regard to probable trends in prices over the period under consideration. Unless there are current and recent data from which future returns can be estimated, the planning is futile and a waste of time.

Normally in the petroleum industry, operators can project price movements 1 to 5 years with sufficient accuracy to protect themselves in investing the new capital required to maintain and expand their activities.

The war controls have changed this fundamental situation common to prewar operations. Crude-oil and product prices, except for advances of minor importance, have been frozen at levels now 3 years old. All the changes during that period involving higher costs, consumer requirements, specifications, and other operating factors that normally would bring about important variations in raw-material and finished-product quotations, have been ignored in the new government price controls.

The net result is that operators have to go back 3 years to arrive at prices based on competitive conditions which they must consider in their postwar studies. Their analyses reveal that these prewar and war data are not adequate for their future projections. Their investigations clearly show that the steady expansion in crude-oil production to the present record levels, the failure to find new reserves to offset this production, and the generally higher costs of finding and producing crude oil, except for the arbitrary restrictions of the pricing agency, would have resulted in higher posted schedules for crude oil.

This situation is particularly important to refiners and manufacturers of natural gasoline. A check covering any 3-year prewar period in product-price trends will show many changes brought about by the interplay of competitive conditions responding to mutations in supply and demand, raw-material costs, transportation, and developments in refining techniques.

The industry's economists and technologists know that the major changes have taken place in refining, which should be reflected in total returns from the manufacturing operations and the comparative price relationship of products. They realize, for example, that the large expansion in catalytic operations, involving cracking, isomerization, alkylation and other processes, now means that motor fuels of required specifications can be refined from the entire range of petroleum hydrocarbons, from the lowest-gravity stocks to the several hydrocarbon gases of refineries and natural-gasoline plants.

But costs are not the same in these old and new processing arts. What can be done will depend on the prices received for the byproducts as well as the major products, and the cost of charging stocks.

No government agency or combination of agencies has the answer to this problem.

Competition is the quickest and fairest method of establishing these markets, and its early resumption in the oil business would be a major contribution in furthering effective and sound postwar planning.

Independents Ask Return of Oil Control to States

DALLAS. — Return of regulatory powers to the oil states was demanded in resolutions adopted by the board of directors of Independent Petroleum Association who met here last week. Other resolutions urged continued use of butane in drilling engines, recommended decentralized administration of wartime regulations, protested against the proposed investigation of the natural-gas industry by Federal Power Commission, and urged that the U. S. Senate refrain from ratifying the Anglo-American petroleum agreement. The meeting of the directors took the place of the usual annual meeting of members.

Ralph T. Zook, Bradford, Pa., was reelected president, as were the other executive officers. Five new vice presidents were chosen, and those vice presidents representing other states were reelected. The new vice presidents: J. D. Sanford, for Illinois, Mount Vernon; J. C. Miller, for Kentucky, Owensboro; C. W. Teater, for Michigan, Saginaw; W. M. Vaughney, for Mississippi, Jackson; Eugene Jordan, for Oklahoma, Oklahoma City.

The directors met in general session on Monday and on Tuesday forenoon. Tuesday afternoon was devoted to committee meetings and preparation of resolutions and reports, upon which the directors acted Wednesday.

In conformity with one of the rseolutions adopted the Interstate Oil Compact Commission is to be requested immediately after the war "to do everything within its power to return the regulation of the oil industry to the state regulatory bodies so that state rights may again prevail and function."

Another resolution urged Congress to use its authority to restore to the states "constitutional control over the development and production of natural resources."

In its resolution directed at the proposed investigation of the natural-gas industry and proposed legislation with respect to production, conservation and the competition of natural gas with other fuels, the directors declared the contemplated action to be "unnecessary, neither required nor essential." They declared further that the FPC "has neither the power, jurisdiction, nor lawful authority to prejudge any applications for certificates of convenience and necessity by the device of announcing a policy in the nature of legislation, which is an exclusive function of the Congress of the United States."

The directors reaffirmed adherence to the association's previously expressed conviction that "private capital, individual initiative, and free competitive enterprise have achieved and will achieve the highest degree of development in exploration, production, refining, marketing, and transportation, in the oil industry." They asserted that the Anglo-American pact "clearly violates" the principle thus enunciated.

The tax policy and advisory committee recommended that the excess-profits tax be repealed immediately after the termination of the war in Europe. "When the war is ended our Government must decide which is the wiser course—to leave the corporations yoked down with a discriminatory burden of taxation or to employ approximately 10,000,000 now in armed service. It cannot do both. We must therefore presume that problem No. 1 that lies ahead of us is that of employment of these men who are now in military service."

Stripper-Well Operators Outline Program

DALLAS.—More aggressive action to accomplish objectives was discussed here at the annual meeting of the National Stripper Well Association, October 10, at the Baker Hotel which will include vigorous opposition to the British-American oil treaty, an effort to have the price of crude oil raised at least 50 cents per barrel and a program for getting a wider application of the present subsidy.

The executive committee of the association expects to meet every 60 to 90 days instead of once a year as heretofore. More attention will be directed toward the formation of new local associations. Members attending the meeting represented stripper producers in California, New Mexico, Louisiana, Arkansas, Texas, Oklahoma, Indiana, Michigan, Ohio, Kentucky, West Virginia and Pennsylvania.

Howard J. Whitehill, newly elected president of National Stripper Well Association

Officers elected for the ensuing year are: Howard J. Whitehill, Tulsa, president, who succeeds J. D. Sandefer, Jr., Breckenridge, Tex.; N. W. Shiarella, vice president, Owensboro, Ky.; H. B. Fell, executive vice president, Ardmore, Okla., and Fred Sehman, secretary and treasurer, Wichita Falls, Tex.

"During the current year," explained Whitehill, "we have been given the stripper well subsidy. Since this seemed to be the only means of immediate relief, this association used its best efforts to the end that the subsidy plan might be made workable. Under the present plan of qualifying for the subsidy by pools and not by leases, an exceedingly large number of operators have not received any benefits. There are hundreds of leases throughout the United States with wells averaging less than 9 bbl. per day, which have been denied help because the leases happened to be located in pools where the well average is in excess of 9 bbl. It will be one of the aims of this association during the ensuing year to attempt to develop some plan which will bring relief to those who have heretofore been left out under the current subsidy arrangement.

"The stripper well production is becoming an increasingly important part of the general oil production picture with every passing year. Out of a total of 410,000 producing wells in the United States considerably more than 300,000 of them are already in the stripper class. Due to the extremely heavy withdrawals of reserves to meet the needs of the war program for the past 2 years, the number of wells dropping into the stripper class has been greatly accelerated."

C.N.G.A. Reviews Wartime Accomplishments of the Industry

by L. P. Stockman

LOS ANGELES. — Discussions of wartime accomplishments of the natural-gasoline industry as well as processes and operating problems of vital interest to the industry were the theme of the nineteenth annual fall meeting of the California Natural Gasoline Association held here October 13. A highlight of the meeting was the announcement in the form of a paper by W. M. Schaufelberger and G. M. Liljenstein of California Research Corp. of a rapid test for isobutane (+) fractions in natural gasoline plant absorber gases, an abstract of which appears on Page 97 of this issue.

The attendance was good and the evening banquet was sold out several days before. Out-of-town visitors attending the meeting included Ray E. Miller, vice president of Hanlon-Buchanan, Inc., Tulsa; William F. Lowe, secretary-treasurer of the Natural Gasoline Association of America, and Dr. Charles L. Thomas of Universal Oil Products Co., Chicago. Dr. Thomas was pinch hitting for Dr. H. H. Wenzke, also of Universal Oil Products Co., who had prepared a paper on "Some Catalytic Processes Utilizing Light Paraffinic Hydrocarbons," but who was unable to be present.

Present officers of the association for the 1944-45 term are C. D. Gard of Union Oil Co., president; M. L. Arnold of Richfield Oil Corp., vice president, and George L. Tyler, secretary-treasurer. No elections are held at the annual fall meeting, these taking place each spring.

C. E. Webber, chief, natural-gasoline section, Petroleum Administration for War, complimented the California natural-gasoline industry for the magnitude of its contribution along with that of the rest of the country. He called attention to the fact that daily production of natural gasoline and allied products in California of 41,000 bbl. prior to the advent of war had been increased to 52,000 bbl. per day at present. In spite of this large increase, however, he felt the amount is nowhere near what will be required to meet the accelerated pace of the Pacific war and that one of the major problems facing the California natural-gasoline industry is to spread the insufficient supply of light fractions thinly enough in some places to allow all essential requirements to be met. The natural-gasoline industry of the country is at present working on 30 major plants or plant expansions which will aggregate $30,000,000 of industry capital.

GARD

SAUERESSIG

C. D. Gard, of Union Oil Co., is president of the California Natural Gasoline Association, and H. P. Saueressig acted as chairman of the fall meeting last week

On pressure maintenance, estimates indicate an additional production of 170,000,000 bbl. at a cost of about $16,000,000 or less than 10 cents per barrel of oil. The discussion brought out the fact that several additional similar installations are scheduled to be erected in California in the immediate future, especially at Coles Levee. The Coles Levee project will be operated by Ohio Oil Co. and will represent a joint venture of all operators in the field. California's first plant of this nature was erected at Paloma and is operated by Western Gulf as a unit operation.

With regard to liquefied petroleum gas, Webber was very pessimistic as anticipated winter demands will take all available supplies including production to come from plants now under construction. The entire country is faced with a critical shortage of both liquefied petroleum gas and pressure tank cars for transporting it. The situation in California is somewhat more favorable than elsewhere.

The speaker expressed the opinion that after the war the natural-gasoline industry will be vitally affected by the additional amount of light fractions that would be produced by catalytic cracking in refineries but that California will not be as seriously affected as the remainder of the country as it was probable the future supply would be lower than anticipated due to the absence of new prolific fields. He recommended that the natural-gasoline industry become interested in chemicals, plastics, and other similar products. Already priorities have been granted for the construction of fractionating columns in cycling plants for producing ethane-propane mixtures to supply some of the major chemical plants making acetaldehyde, alcohol, glycols, hexamine, carbon tetrachloride, perchlorethylene, chloroform, butadiene, and many others. During this same period four major chemical and plastic manufacturers have made inquiries concerning further sources of propane and ethane mixtures.

No attempt is being made to recover propane at the Paloma cycling plant but this will probably be done at a later date if the market warrants. One of the postwar problems in California is to construct the necessary equipment and make the required alterations in equipment to produce ethane-propane mixtures in sufficient centralized quantities to attract the chemical industry. The war has brought the natural-gasoline producer, the refiner, and the chemical industry closer together.

Abstracts of several technical papers presented at the C. N. G. A. meeting are published in the Engineering and Operating Section, on page 97 of this issue.

Recommendation on Coke Production Revoked

Revocation of Recommendation 56, issued by Petroleum Administration for War in November 1942 to gain maximum production of petroleum coke from refineries and assure adequate supplies for essential manufacturing purposes, particularly in the aluminum industry, has been announced by Ralph K. Davies, deputy petroleum administrator. Davies said the output of this coke exceeds essential industrial demands.

Specific Prices Set for Natural Gasoline

WASHINGTON.—New ceiling prices have been set by the Office of Price Administration on natural gasoline for blending, effective October 23. Specific dollar and cent ceilings are set for eight vapor pressures on shipments to District 1 from seven Mid-Continent and southwestern states, while formulas for ascertaining prices are established for sales elsewhere. OPA stated the new ceilings would not cause any change in the general level of existing prices but would result in a limited number of changes in individual prices that vary from the general level.

A.P.I. Board of Directors To Meet December 7

NEW YORK.—W. R. Boyd, Jr., president of American Petroleum Institute, has called a meeting of the board of directors to be held December 7 in the Statler Hotel, Washington. A date for the deferred Silver Jubilee meeting of the Institute in the spring of 1945 will be discussed, along with current and impending major problems of the industry and the relationship of the Institute to those problems. An all-day meeting of the board is planned with a meeting of the executive committee in the evening. The Pearl Harbor Day meeting of the board will follow a session of Petroleum Industry War Council on December 6.

Directors of the Institute are requested to advise Lacey Walker, secretary, at the New York headquarters of the A.P.I. if they plan to attend the board meeting.

Union Oil and Paraguay to Join in Oil Development

LOS ANGELES. — Following a year of negotiation, Union Oil Co. of California has joined with the Government of Paraguay in a plan to explore and develop the oil possibilities of the Gran Chaco region.

Announcing the project, Reese H. Taylor, president of Union, said: "The agreement provides that the Paraguayan Government itself will share in exploration for possible oil reserves. This is not the usual type of agreement with a South American government. The long-range plan includes geological and geophysical investigations to be followed by exploratory drilling and development."

Japanese and German Oil Installations Blasted

LONDON.—Gen. Douglas MacArthur, whose air force is trying to obliterate Japan's big oil refinery at Balikpapan, Borneo, announced further smashing blows last week. In one of the latest raids 60 Liberators unloaded bombs on this rich source of gasoline and lubricating oil, leaving great fires.

The raid is of significance in connection with Japanese broadcasts indicating that Nippon is pinched for oil supplies. These broadcasts reported intention of the Government to create a single synthetic-oil control combine in Japan, Korea and Manchuria "to boost production."

The smash at Balikpapan followed a series of air attacks on Japanese oil installations on the islands of Boeroe and Ceram. The raiders hit the oil storage center, curtailing the supplies for the Japanese.

Severe shipping losses have reduced Nippon's ability to exploit rich Dutch Indies oil resources and forced development of synthetic substitutes. Another tanker was among 11 Japanese ships sunk or damaged in new air strikes in the Pacific.

On October 6, British Lancasters and Halifaxes to the number of 500 struck synthetic-oil plants in the Ruhr. The Fortresses and Liberators, under escort of 800 fighters, poured explosives on oil refineries, tank factories, aircraft-engine plants and ordnance dumps. The British planes, also well protected by fighters, made a heavy attack on synthetic-oil plants at Scholden-Buer and Sterkrade in the Ruhr Valley, in good flying weather.

Soviet Mission Seeks Oil Concession in Iran

MOSCOW. — Departing from a long-established policy of devoting its attention to developments of resources within its own borders, to the exclusion of other regions, the Soviet Government now is holding conversations with Iran looking to acquisition of an oil concession in the northern part of that country. This information became public here the day after the arrival of Prime Minister Churchill and Foreign Secretary Anthony Eden for conferences with Premier Stalin and Foreign Commissar Molotoff. A Tass dispatch from Teheran quoted a statement published in the Teheran newspaper Ettelaat to the effect that a Soviet mission was already in Iran conducting negotiations concerning the oil concession.

In the early years of the Soviet Union foreign capital got concessions for oil, gold, manganese, coal and other raw materials, but these have gradually been liquidated, the last one last spring when the Japanese gave up their oil and coal concessions on North Sakhalin Island. The Soviet Government had no inclination to invest labor and funds outside its own boundaries.

The Teheran dispatch says Soviet experts have made preliminary studies of northern Iranian oil deposits and that the Soviet Government had instructed the commission now in Iran "to propose to the Iranian Government a plan for giving to the U.S.S.R. the right to search for and exploit oil in northern Iran" on the theory that oil production developed by Iranian labor and Soviet engineering skill would contribute beneficially to the economic betterment of both countries.

The Iranian newspaper said that if Iran could organize the exploitation of her own oil resources, it would undoubtedly be a mistake to grant concessions to foreigners, but added:

"But if this is impossible, the government and parliament ought to make a careful survey of the terms proposed and if they find that the conditions proposed by an American company for the exploitation of oil in southeast and the Iran Soviet conditions for northern oil are advantageous and useful and in no way harmful to Iran's national rights, why not grant concessions that will contribute to the fight against unemployment, poverty and hunger?

"If the terms proposed are unacceptable and detrimental to the interests of the country, the government and parliament must say so clearly without delay."

Correction

NEW YORK. — Recently it was stated in the Journal that a Shell company affiliate was planning operations in the trans-Andean district of Peru. This was erroneous. The exploratory activities mentioned are being sponsored by the Peruvian Government, it is understood.

These operations are projected for the Madre de Dios district, with a tentative location for the initial test well having been selected near the bank of the Orellava River about 50 miles from Contamana.

DEATHS

Ambrose M. Donoghue, 64, manager of crude-oil purchases and sales for The Texas Co., died October 16 in Houston. He was one of the oldest employes of the company in point of service, having joined it in 1903, in Beaumont, Tex., about a year after its organization.

C. W. Boller, 62, independent oil operator in Texas since 1925, died October 10 in Dallas.

S. H. Rice, 56, assistant to the general manager of The Texas Co.'s marine department, died October 11 at his home in New York. He had been associated with Texas since 1914. He was department agent for Texaco's marine department from 1921 until last May, when he was appointed assistant to the general manager.

Lt. William E. Bacon, 26, in the public-relations department of The Texas Co. in Denver until his enlistment, was killed in action September 20 in Germany according to a telegram received by his mother, Mrs. Charles M. Reed, of Denver.

Dredging Canals for Servicing Fields in Marsh and Swamp Districts of Louisiana

by Neil Williams

Submerged wooded swamps and floating, sliding, and heaving marshes create problems and increase costs. Difficulties of building and maintaining fills and plank roads are met by waterways, boats and barges.

BECAUSE of the difficulty, often impossibility, of building roads, servicing of fields and wells in marsh areas of coastal Louisiana usually is conducted by means of canals and other waterways, utilizing barges and boats. In some fields, depending upon their size and number and location pattern of wells, somewhat extensive canal systems are necessitated. Where fields are removed or isolated from dry-land approaches, long access channels sometimes must be provided.

Dredging and maintenance of canals represents an important phase of operations in these areas. Although costs generally are considerably less than would be entailed in building and maintaining road fills and plank roadways, if these were possible, nevertheless various problems and hazards frequently are encountered in the work. Marsh conditions vary greatly in different localities, necessitating varied methods of dredging and excavation and use of different types of equipment.

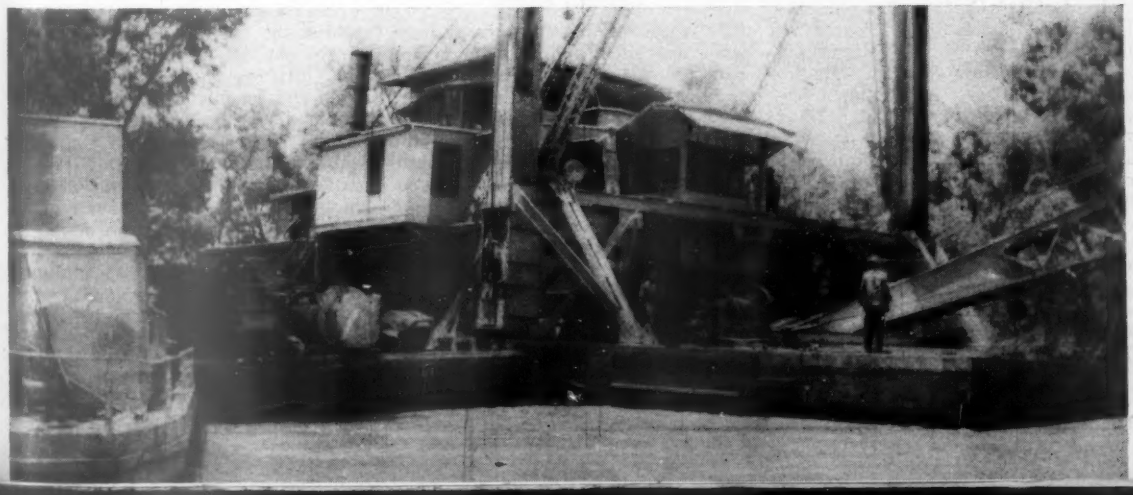
Some of the different types of conditions encountered include submerged wooded swamps, floating sea marsh,, sliding marsh and heaving marsh. Submerged wooded swamps present a particularly difficult and treacherous condition. Overlain with marsh depositions, they give no visible evidence of their presence on the surface. Not being anticipated in advance, they present a hazard to dredging equipment and increase costs substantially.

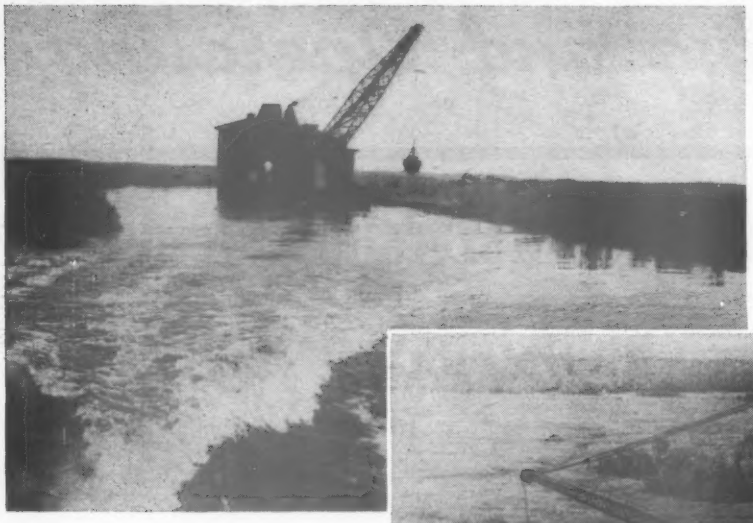
Buried Wooded Swamps

Typical of buried wooded swamps are the conditions encountered in dredging a canal system for the Avery Island field, St. Mary's Parish. This canal system was dredged the past year, the original project consisting of a main district canal with lateral slips to nine well locations and totaling approximately 16,000 ft. The surface appeared as any other sea marsh, but when the dredge started in it encountered a thick growth of large cypress trees underneath. Huge stumps and logs up to 5 ft. in diameter and as much as 30 ft. long were removed intact, materially slowing up work. A large clam-shell dredge, one of the largest in the district, had to be employed for this purpose. The spoil removed consisted of about 100 per cent humus and wooded material.

Floating sea marsh presents another problem in that the consistency of the surface often is such that it cannot be handled either with a clam shell or "orange peel" bucket type of dredge. This necessitates the use of a suction dredge, which in many places is not desired as this type dredge often is destructive of muskrats, trapping of which is an important industry in marsh areas of Louisiana. At the same time, the floating marsh frequently carries such a heavy growth of grass that it cannot be pumped readily by the dredge, and also

Dredge cutting a canal through a Coastal Louisiana wooded swamp. It employs a long boom and clam-shell bucket





Above: Dredging a canal extension to a new well location in one of coastal Louisiana's many tidal marsh fields. Right: Large clam-shell type of dredge operating in marsh overlying a submerged wooded swamp

much trouble may be experienced by clogging of pumps for the engine cooling water system. In places the grass is in such quantities that it cannot be handled even by the largest of suction dredges.

When such conditions are encountered, some operators now follow the practice of going in first with a dragline to strip the grass matting from the surface and then following this with a suction dredge to cut the additional depth required. With this, the work and cost of cutting canals is increased. One of the principal difficulties in the use of the dragline or in cutting canals with a clam shell or other bucket type of dredge is in obtaining a boom with sufficient length to place the spoil far enough back from the canal to keep it from working back in and filling the cut.

Sliding marsh, another hazard, is a particular problem in those areas subject to overflow where deposition of silt is heavy. An example is in the Potash field, located on the east bank of the Mississippi River below New Orleans. The location is entirely within an overflow spillway, through which flood water of the river flows in an even sheet for several miles on both sides of the field. During each period of high water as much as 1 to 1½ ft. of silt is deposited. When dredging canals, if spoil is placed on one side of a cut without balancing earth and water pressure in the canal, the bordering marsh will slide into the canal along the plane of deposit.

A recent attempt to excavate a canal along the west side of the field, paralleling the river about 800 ft. back from the bank had to be abandoned because of slides. The excavation was started with spoil being deposited on the river side with a view to forming a levee to protect not only this canal but others in the field from silting during overflows. The cut was to be 60 ft. wide and 12 ft. deep, placing the bottom at 8.0 ft. below mean Gulf level. The project was less than half complete when the first slide occurred, causing a section of spoil about 200 ft. long and 60 ft. wide to slide into the cut. Because of the proximity of the cut to the river and danger of the river channeling into the field through it by reason of slides, the remainder of the cut was filled, and the project given up.

Heaving Marsh

In cases of heaving marsh, the spoil deposited at the side on the bank of the cut does not actually slide into the canal, but rather the load causes the bank and spoil to subside, forcing the bottom of the cut to rise or heave under the pressure exerted. It has been observed, however, that most instances of heaving occur when canals are dredged during periods of low tides, and particularly when the water level during these periods drops below the level of the marsh. Consequently, some operators have adopted the practice of making canal excavations where these conditions prevail, only during periods of high tides. In this it has been found that the spoils are allowed to set and retain their proper sections. The reason attributed to this is that during periods of high tide, the water pressure in the canal increases sufficiently to sustain the canal. During periods of low tides, the water recedes from the canal and the reduced pressure is overbalanced by the load on the bank unless the spoils have had time to set.

Although there is no set standard of uniformity as to canal specifications, main channels within fields usually are cut to a width of from 70 to 90 ft. This width will permit the passage of the largest drilling barges without uncoupling the twin hulls. Slips for well locations ordinarily are cut to a width of from 120 to 150 ft. to accommodate servicing of wells. Most canals are box cut, giving a bottom approximately the same width as the top. A water depth of from 8 to 9 ft. ordinarily is adequate. Dredging costs vary greatly, depending on areas and types of conditions but average from $0.130 to $0.256 per cubic yard, or from about $3 to 5 per lineal foot for channels 70 to 80 ft. wide.

Advantages of water operations in development and servicing of fields are such that operators in a number of instances have elected to excavate canal systems in areas in which the surface is comparatively dry most of the time and where land drilling rigs could have been used and roads provided without too much difficulty. In these cases, the fields have been close to navigable water courses through which drilling barges could be towed in. It has been found that even when canals must be cut from semisolid ground, the cost may be less than that for throwing up fills and laying plank roadways. Added to this is the savings realized in reduction of rig time by drilling-barge operation, and by water transportation of supplies and equipment.

C.N.G.A. ABSTRACTS

of papers at the fall meeting of California Natural Gasoline Association at Los Angeles

Catalytic Processes Utilizing Light Paraffinic Hydrocarbons

DR. H. H. WENZKE, Universal Oil Products Co., Chicago. Presented by DR. CHARLES L. THOMAS, Universal Oil Products Co., Chicago.

THE production of motor fuel promises to be one of the principal outlets for large volumes of the light paraffinic hydrocarbons. Preparation of chemical derivatives, however, is already utilizing large quantities of hydrocarbon gases, and the importance of this field will undoubtedly increase. Ethane may be decomposed thermally to give high ultimate yields of ethylene but as the complexity of the paraffinic molecule increases the thermal reaction becomes more complex and both cracking and dehydrogenation take place. When a catalyst such as alumina-chromia is used with such substances as propane, butane, and pentane the principal chemical reaction is dehydrogenation.

The first step in the dehydrogenation of normal butane and pentane gives the monoolefin which may be further dehydrogenated to the diolefin. A catalyst such as solid phosphoric acid polymerizes propylene and butylene, changing them from gases to liquids in the boiling range of motor fuel. In the presence of hydrogen fluoride, isobutane unites with olefins to form a motor fuel which is saturated under the present condition of processing. Normal butane and pentane are changed to the branched isomer in the presence of a catalyst consisting of aluminum chloride and hydrogen chloride. Slides were shown with the paper presenting flow diagrams of such commercial processes as dehydrogenation, alkylation, and isomerization.

Detection of Reservoir Gas Movement in Pressure Control

H. VAN WINGEN and E. P. VALBY, Richfield Oil Corp., Long Beach.

THIS paper discusses the importance of reservoir gas as an agent in affecting the efficiency of oil recovery and stresses the need of an adequate knowledge of subsurface conditions affecting control of gas movement and its relation to oil recovery. The use of tracers to determine migration of gas may, in the authors' opinions, soon be supplanted by the well effluent analysis method, a recent development, which gives more positive results. A portion of the material for this paper has been taken by the authors from their A.I.M.E. paper to be given at the Los Angeles fall meeting of the A.I.M.E., Petroleum Division, October 20.

The physical indications of gas or vapor-phase migration can be similar in nature for the liquid-phase reservoir or for the vapor-liquid-phase reservoir. However, these similar physical indications may be the result of different types of movement of gas or fluids in each type of reservoir. The first usual indication of migration of gas is an increase in production gas-oil ratio; cubic feet of wet gas produced at standard conditions per barrel of tank oil. In a single-liquid-phase reservoir an increased gas-oil ratio is an indication of the migration of liberated solution gas or injected gas. In a two-phase reservoir the increased gas-oil ratio can result from the movement of gas of two types, gas-cap fluid and injected gas separately or a combination of both, and even the enriched injection gas alone. A second physical indication of possible gas migration is shown by the gravity of tank oil. Under cycling operations, production of injected gas should result in a decrease of gravity of tank oil due to stripping effect at trapping conditions and its effect on retrograde condensation. Pressure maintenance in a single-liquid-phase reservoir usually results in an increased tank-oil gravity due to the stripping of volatile components of the residual oil at reservoir conditions, and mixing of these vapors with normal oil production. In a two-phase reservoir, an increased tank-oil gravity may also be the result of the expansion of the original gas cap to a well bore completed in the dark-oil phase.

Consideration of some of the disadvantages and limitation of using tracers has led to the development of a new method for the detection of gas migration designated as the well-effluent-analysis method. Periodic surveys by this well-effluent-analysis method in a producing field under pressure-control operation by injected gas, will give information as to the migration of gas cap fluid and injected gas. Such a survey requires the fractional analyses of two samples per well, wet gas and trap fluid, the production data, and about 3 hours' calculating time. The cost per well would be from $50 to $60 per survey and will give more information than the use of a tracer process.

A Rapid Test for Isobutane (+) Fractions in Gases

W. M. SCHAUFELBERGER and G. M. LILJENSTEIN, California Research Corp., San Francisco.

THIS paper presents a method for the determination of critically important isobutane (+) fractions in absorber residue gases that has proved an invaluable aid in checking absorber performance. During the past few years isobutane and normal butane have become critical war materials, and as a result natural-gasoline-absorption-plant operations have been stepped up for maximum extraction of these fractions. This condition has created the need for a rapid field testing method for determining the losses of isobutane (+) fractions in the plant residue gases.

The need for a quick test was met by developing a method along the lines of the butane absorption-weathering test (B-W test) for pentanes (+) which was presented at the February 1935 meeting of the California Natural Gasoline Association by R. N. Donaldson of Standard Oil Co. of California. This earlier pentanes (+) test consists of passing a metered volume of gas through a liquid butane solvent at —44° F. temperature and weathering the contacted solvent to a prescribed end-point temperature. The new isobutane (+) test is similar except that it is run at —110° F. and employs a liquid propane solvent. This similarity permits combining the two methods and both have been incorporated in the procedure, thus providing a means for determining the butanes and the pentanes (+) contents of absorber residue gases. The butanes may be split into iso and normal butane when absorption factor and intake composition data are known. The test is conducted at low temperature to minimize loss of butanes or pentanes (+) fractions during the absorption step and prevent excessive loss of solvent. The gas to be tested is passed through the solvent until the desired amount of material is absorbed. The contacted solvent is then allowed to weather in the air until the liquid residue reaches the prescribed end-point temperature. Boiling is then stopped by momentarily immersing the tip of the tube in the cooling bath, and the residue volume is read and recorded. The residue is then converted to milliliter of isobutane (+) or pentanes (+) by standardization charts.

The B-W test employs an absorbent consisting of a pentanes-free mixture of isobutane and normal butane containing a maximum of 10 per cent of propane. The P-W test solvent consists of a butanes-free propane cut containing a maximum of 5 per cent ethane. One advantageous feature of the test is that workable quantities of liquid isobutane (+) or pentanes (+) may be accumulated by passing a sufficient volume of gas through the absorption tube.

Butane Dehydration by The Houdry Process

R. C. LASSIAT, Catalytic Development Corp., and F. D. PARKER, Bechtel-McCone Corp.

DEHYDROGENATION of light hydrocarbons has attracted considerable attention in recent years as a means for making the large quantities of natural-gas constituents available for manufacture of petroleum constituents, chemicals and chemical intermediates. At the beginning of the present war, major interest was focused on the production of butadiene, principal constituent of buna-S synthetic rubber. Buna-S rubber production represents approximately 83 per cent of the total planned United States synthetic rubber production.

In the Houdry adiabatic dehydrogenation process, dehydrogenation is accomplished by passing preheated hydrogen vapors under controlled conditions of space velocity, temperature and pressure over catalysts of the chromic oxide (Cr_2O_3)-alumina type. A study of their catalytic behavior as related to their physical and chemical characteristics has resulted in the preparation of materials of controlled and highly selective activity suitable for various dehydrogenation charging stocks described in this paper. The characteristic feature of the Houdry dehydrogenation process is that the operating conditions are so chosen that the heat used for the reaction during the on-stream period is substantially the same as the heat developed by the combustion of the coke deposit. Furthermore, the heat capacity of the catalyst bed is controlled by mixing with the active catalyst in the form of pellets a catalytically inert material. Several sources of such inert material are available, but secrecy orders do not permit disclosure of further details at this time. The inert material acts as a heat-storage medium absorbing, during the regeneration cycle, the heat liberated by the combustion of the coke deposit, with a consequent increase in temperature of the bed, and releasing that heat to the reacting hydrocarbons during the dehydrogenation period, with decreasing temperature. The inert material possesses a very large surface and the heat exchange between this material, the catalyst pellet, and the reactants takes place with very small temperature differences.

Core Analysis: Methods and Applications —A Summary

by Kenneth B. Barnes

IN the field of analyses of oil-producing formations, the early tests made were for porosity, grain size, and qualitative indications of oil saturation. These tests were commenced 25 or more years ago, using whatever chips, pieces, or cores of the pays could be obtained from the well. Such studies were very limited in scope and did not reveal a great deal about reservoir conditions.

Artificial water flooding was commenced in the Bradford pool of Pennsylvania about 1928. As intensive application and development of the process proceeded it was recognized that many factors had to be learned about the 100,000 acres of oil sand that would eventually be flooded. Cable-tool cores were taken of the pay and tests for oil saturation made to determine the amount of oil in place under the properties. Porosity tests were made, and efforts to measure permeability ultimately were successful. These records were compared with the oil recovery obtained and correlations established to determine the amount of oil recovered by flooding. In a few years' time coring in waterflood development at Bradford had become a standard procedure.

While this development was under way at Bradford similar efforts were started in the flush field areas of the Southwest, in California, and elsewhere, to learn, from cores, more about the character of oil and gas reservoirs. Success in this work has led to the extensive use of core testing at the present time in practically all areas in everyday work. The different tests made furnish definite values for each core recovered. Well by well and pay by pay, these data have accumulated together with corresponding data for oil, gas and water production; bottom-hole pressure; temperature, and samples from the wells. In a comparatively short time these tests and information have become very important in petroleum production-engineering work.

Concurrently, many improvements have been made in core barrels, muds to use while coring, and in the techniques of coring. There is now available a rather wide selection of cutter heads, "conventional" core barrels, wire-line core barrels, oil-base, starch, and other muds, and side-wall core takers for use as an adjunct with electric logs. Automatic recorders for the rate of penetration of rotary drilling have been improved and provide supplementary information. Instruments and services for detecting oil and gas in the mud stream for known depths are available, and the procedure may be coupled with coring and core analyses.

The very considerable effort on core analysis has led to voluminous literature on the different phases, and the following material is in the nature of a summary of the main types of tests, subdivisions in procedure, and classification of utilization, together with appropriate references:

Porosity.

A. Test methods and equipment:

1. Volumetric pore volume test methods:

(a) Washburn-Bunting.[1]

(b) Boyles law.[1 2 3]

(c) Kobe.[4]

(d) Mercury saturation of pores.

(e) Russell.[5]

2. Gravimetric pore volume test methods:

(a) Tetrachlorethane saturation.[6]

(b) Melcher-Nutting on density.[1 7 8]

3. Bulk or total volume methods:

(a) Pycnometer.

(b) Calculation from dimensions.

The above procedures each have certain ranges or appropriate applications, and the selection of the specific porosity method to be employed will depend upon:

(a) Determining effective or total porosity.

(b) Altering the sample.

(c) Size and kind of sample to be tested.

(d) Time required for testing.

Saturation, oil and water.

Oil and water saturation, as given by core data, means the volumes of oil and water that are found in the core samples tested. The saturation may be expressed either as the percentage occupancy of the dry pore volume, or as barrels per acre-foot.

A. Test methods and equipment:

1. Retort methods:

(a) Volumetric.[1 9 10 11 12]

(b) Gravimetric.[13]

2. Solvent methods:

(a) Oil, gravimetric or volumetric.[1 14]

(b) Water, gravimetric or volumetric.[1 14 15 16 17]

3. Calorimetric and refractive index methods.[17a 17b]

B. Tracers. Irreducible water saturation of dry formation samples.

Tracers[18 19] and oil-base muds[13] have been used for determining the true interstitial water contents of oil-bearing formations. The irreducible water saturation, found for dry formation samples, is a promising laboratory development.[20 21] It may be such procedures and data will find wide applications where interstitial water data are utilized.

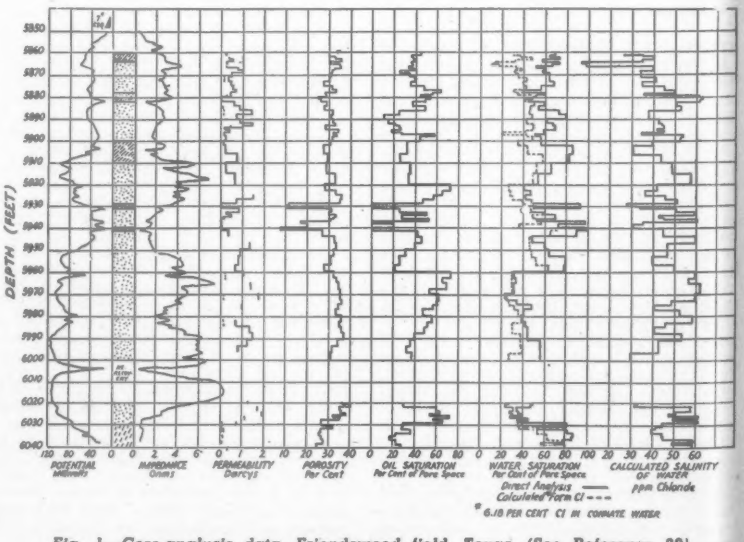
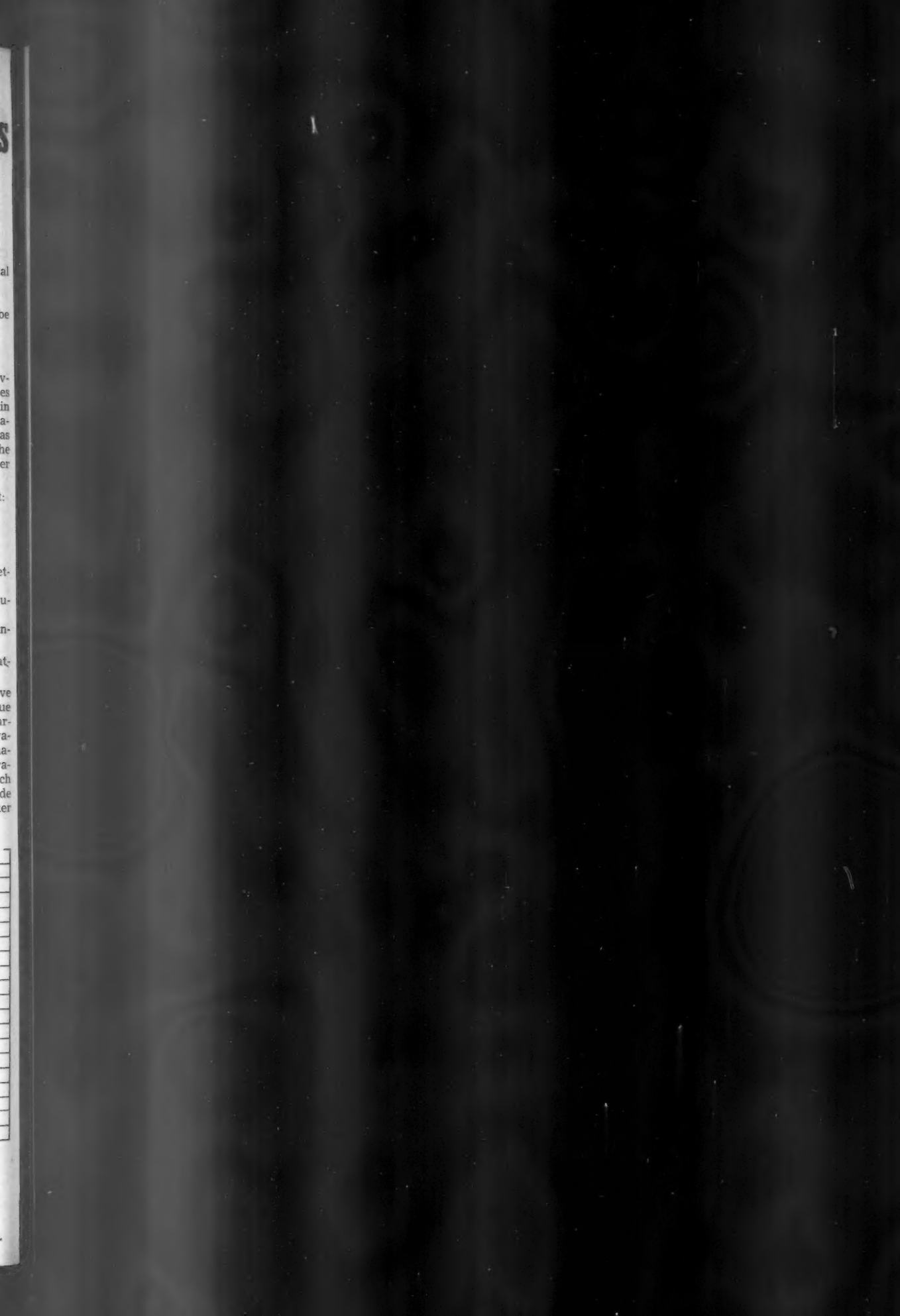


Fig. 1—Core-analysis data, Friendswood field, Texas. (See Reference 28)



Chemi
The
cores a
A. C
This
1. C
2. C
p.p.m.
3. A
core (
B. S
Perme
Perr
comm
sive a
on pe
and ti
culatio
refere
editio
Deter
Media
leum
Dalla
value
forma
porta
Eff
fectiv
medi
medi
multi
the n
bility
centa
with
ent.
tive
term
inve
dure
tinui
Re
tive
diun
phas
um
tion
the
latte
the
mea
Oil
T
core
forr
flus
exis
and
on
is p
con
cul
The
in
app
san
fro
lyi
ure
wa
the
mi
ce
the
an
in

Chemical analyses of cores.

The usual chemical analyses on cores are:

A. Chloride content.

This may be expressed as:

1. Cl in dry core, p.p.m.

2. Cl in water present in core, p.p.m.

3. Amount of interstitial water in core (if not flushed).[22]

B. Solubility in HCl.

Permeability.

Permeability is one of the most common core tests and finds extensive application. A complete treatise on permeability, as to definitions and theory; measurements and calculations; laboratory procedure; and references, is given in the second edition of "Standard Procedure for Determining Permeability of Porous Media," issued by American Petroleum Institute, Production Division, Dallas. Besides the permeability value representing the dry, clean formation, there are two very important fundamental cases:

Effective permeability. — The effective permeability of a porous medium is the permeability of the medium to one fluid phase of a multiphase fluid system present in the medium. The "effective permeability" is a function of the percentage saturation of the medium with respect to all fluid phases present. This, and the kindred relative permeability, are subject to determination in the laboratory, and investigations to simplify the procedures for routine testing are continuing.

Relative permeability. — The relative permeability of a porous medium to one fluid phase of a multiphase system existing in the medium at definite percentages saturation of fluid phases, is defined as the effective permeability when the latter is expressed as the ratio of the effective permeability to permeability.

Oil recovery tests of cores.

This procedure consists of taking core samples of the oil-productive formation which have not been flushed of the oil and water content existing in place in the formation, and running a miniature water drive on them. (A gas or air drive test is possible but the technique is more complicated and the results difficult to interpret in economic terms.) The prepared samples are mounted in pressure receptacles and water applied to the outside. The oil in the sample is driven to the center hole from which it drops into an underlying glass receptacle and is measured. After complete flooding, the watered-out core is broken up and the remaining oil content determined by extraction or retort procedure. The results therefore yield the following information: the amount of oil originally contained in the core, the amount recovered, and the amount left after complete water flooding.

Core sampling and handling.

A. Sampling.—The frequency, size, etc., will depend on which of the following tests the samples are for:

1. Saturation: (a) Selection, (b) preservation.

2. Permeability.

3. Porosity.

4. Chemical analyses.

5. Oil-recovery tests.

B. Handling:

1. Testing cores at well.

2. Testing cores at central laboratory: (a) Field description, (b) boxing and shipping.

Construction of core graphs.

This involves the following phases:

A. Location of core recovery and all test samples with respect to depth.

B. Transfer of data to tracing or finished core graph.

C. Core data and electrical survey side by side or superimposed.

At the present time there are many different core-graph forms in use, and currently the A.P.I. subcommittee on core analysis and electric logging is working on a suggested universal form. An example[23] of a core-graph form showing the data most usually reported is given in Fig. 1.

Interpretation and usefulness of core analyses.

A number of papers have treated the interpretation and application of core analyses in detail,[20,24,25,26,27] covering the following subjects:

A. Flush and semiflush reservoirs:

1. Distinction between "oil pay" and "water pay" conditions.

2. Capacity or productivity index of productive formation.

3. Aid in well completion, such as location of gas-oil contacts, delineation of zones, and in workover operations.

4. Estimation of reserves.

B. Low-pressure reservoirs — secondary-recovery operations:

1. Estimates for oil recovery.

2. Location for shots, packer settings, points for selective injection, etc.

C. Salt-water disposal:

1. Capacity index for injection.

References

1. "Porosity and Saturation Methods," K. B. Barnes, A.P.I. Drilling and Production Practice, 1936, pp. 191-203.

2. "A Method of Determining Porosity: A List of Porosities of Oil Sands," D. B. Taliaferro, T. W. Johnson, E. J. Dewees, U. S. Bureau of Mines R.I. 3352 (Sept. 1937).

3. "A New Porosimeter of the Determination of Porosity by the Gas-Expansion Method," A. B. Stevens, A.I.M.E. Petr. Tech., May 1939, T.P. No. 1061.

4. "Development of Hydrogen Porosimeter," C. J. Coberly and A. B. Stevens, A.I.M.E. Petr. Dev. & Tech., Vol. 103 (1933), pp. 261-269.

5. "A Quick Method for Determining Porosity," W. L. Russell, Bull. A.A.P.G., Vol. 10, No. 10, Oct. 1926.

6. "A Method for Determining the Effective Porosity of a Reservoir Rock," K. B. Barnes, Min. Ind. Exp. Sta. Bull. 10 (1931) Penn. State College.

7. "Determination of Pore Space of Oil and Gas Sands," A. F. Melcher, Trans. A.I.M.E., Vol. 65 (1921), pp. 469-490. Also, A. F. Melcher, Bull. A.A.P.G., Vol. 8 (1924), pp. 716-774.

8. "Physical Analysis of Oil Sands," P. G. Nutting, Bull. A.A.P.G., Vol. 14, No. 10 (1930), pp. 1337-1349.

9. "An Improved Design of Retort Equipment for Saturation Tests," K. B. Barnes, A.P.I. Prod. Bull. 226, Nov. 1940.

10. "Determination of Water in Core Samples by the Distillation Method," E. S. Hill, Min. Ind. Exp. Sta. Bull. 19, pp. 55-66 (1935) Penn State College.

11. "Core Analysis," H. C. Pyle and V. E. Sherborne, Trans. A.I.M.E., Vol. 132 (1939), pp. 35-39.

12. "Determination of Oil and Water Saturation by Retort Method," S. T. Yuster and J. S. Levine, Oil Weekly, May 23, 1938.

13. "Connate Water in Oil and Gas Sands," R. J. Schilthuis, Trans. A.I.M.E., Vol. 127 (1938), pp. 199-212.

14. "Saturations by An Extraction-Distillation Method," S. T. Yuster, Min. Ind. Exp. Sta. Bull. 38 (1943), pp. 23-26, Penn State College.

15. "A Method for Determining the Water Content of Oil Sands," D. B. Taliaferro and G. B. Spencer, U. S. Bureau of Mines R.I. 3535, Sept. 1940.

16. "Determining Water Content of Cores by Application of a Critical Solution Temperature Method," M. D. Taylor, The Oil and Gas Journal, June 16, 1938.

17. "A Method for Determining the Water Content of Sands," H. C. Botstet, A.I.M.E. Tech., Aug. 1938.

17a. "Colorimetric Method of Determining Percentage of Oil in Cores," D. Hillis, Bull. A.A.P.G., Vol. 21, No. 11, Nov. 1937, pp. 1477-1485.

17b. "Evaluation of Petroleum in Oil Sands by Its Index of Refraction," H. D. Hedburg, Bull. A.A.P.G., Vol. 21, No. 11, Nov. 1937, pp. 1464-1476.

18. "Quantitative Determination of the Connate-Water Content of Oil Sands," H. C. Pyle and P. H. Jones, A.P.I. Drilling and Production Practice, 1936, pp. 171-179.

19. "Contamination of Cores by Drilling Fluid Can Be Estimated by Dissolving Simple Chemicals in Mud," W. L. Horner, Oil Weekly, July 1, 1935.

20. Hassler, Brunner, and Deahl, Pech. Tech., Sept. 1943.

21. "Determination of Interstitial Water Content of Oil and Gas Sand by Laboratory Tests of Core Samples," W. J. McCullough, F. W. Albaugh and P. H. Jones, A.P.I. spring meeting, Los Angeles, Mar. 23, 1944.

22. "Distinguishing Between Oil Zones and Water Zones From the Connate Water-Oil Ratios Determined by Core Analysis," K. B. Barnes and R. W. Woods, A.P.I. Prod. Bull. 224 (1939), pp. 140-145.

23. "Core-Analysis Interpretation," N. Johnston, A.P.I. Drilling and Prod. (1941), and The Oil and Gas Journal, May 22, 1941, pp. 78, 79, 101-109.

24. "Application of Core Analysis to Production Methods," J. Lewis, The Oil and Gas Journal, Oct. 31, 1940, p. 56.

25. "Core Analysis—An Aid to Increasing the Recovery of Oil," J. Lewis, A.I.M.E. Pet. Dev. & Tech., 1942.

26. "An Investigation as to the Comparativeness of Results Obtained in Core-Analysis Laboratories Under Routine Conditions," J. E. Sherborne, A.P.I. Prod. Bull. 226, Nov. 1940, pp. 124-129.

27. "Determining Productivity of Reservoirs by Bottom-Hole Pressure and Core Analysis," W. S. Walls, The Oil and Gas Journal, Mar. 3, 1938, p. 64, and Mar. 10, 1938.

28. "Core Data for the Friendswood Field and General Notes on Core Data," R. J. Schilthuis, A.P.I. Prod. Bull. 223 (1939), pp. 95-96.

YOU ARE SURE OF LONGER TROUBL

"Change the bushing and save the

Choke Control of Gulf Coast Wells

by J. E. Loeffler *

THE ordinary well choke, a comparatively small and mechanically simple piece of equipment, has an extremely important role in controlling the normal flow characteristics of a great number of Gulf Coast wells. With proper engineering understanding and manipulation of this piece of equipment it is possible not only to control the day-by-day oil production of a well, but to exert a favorable effect upon gas-oil ratio, water-oil ratio, volume of sand produced, and, of greatest importance, the ultimate recovery.

While all christmas trees for producing Gulf Coast wells are fundamentally alike, there are many minor differences, resulting from the necessity of meeting special conditions, or from personal opinions in design. However, that which might be called a typical christmas tree, in so far as the choke-equipment location is concerned, is shown in Fig. 1. The schematic diagram shows the relative position of chokes or flow beans on a high-pressure well which may be produced either through the tubing or annular space, or from both simultaneously as in the case of a dually completed well. A simpler type of high-pressure christmas tree, with a single positive choke, is shown in Fig. 2.

*Chief engineer, Thornhill-Craver Co., Inc., Houston.

This is the first of a series of articles on the production of wells through chokes. Data are derived from lecture notes used by J. E. Loeffler in the Texas A. & M. extension course, Engineering and Science of Oil Exploration. This subject was presented in Houston as a part of the engineering, science and management war training program sponsored by the United States office of education, under the instructorship of F. A. Runion and Dr. J. Brian Eby.

Initial Flow Control

Very often, first use of choke equipment comes when the drilling mud is unloaded from the well. In this stage, wells are permitted to clean themselves as quickly as safe practice permits, and no flow restriction is applied until after the mud has been completely flowed out. Then the well is gradually "beaned back" to prevent sanding up and set to the normal production rate.

A small amount of sand can be produced without danger during the time the well is cleaning itself, but it should be watched very closely. Samples should be taken frequently, and, as the percentage of water and mud decreases, the back pressure, by means of choke control, gradually increased. In a well beaned back too rapidly, if it is making too much sand, the sand will tend to settle out due to the reduced velocity and thus present a sanding-up hazard. The other extreme, opening up too rapidly, is likewise undesirable, since the disturbed pressure conditions will have a tendency to start sand entering the well.

Maintenance of Records Important

Maintenance of choke records (from the moment this equipment is first used to the end of the flowing life of a well) is of vital importance. Inasmuch as the conditions of each well are different, knowledge gained during the early stages of choke application is quite valuable in determining the procedure to be followed when future changes become necessary. While records vary from company to company, it is established that data, chronologically maintained, should be recorded in respect to: choke size, well-head pressures, actual gages of both oil and water, sand content of fluid, production of gas, and pertinent remarks concerning well behavior under the condition imposed. This information is necessary for efficient choke application during the flow-

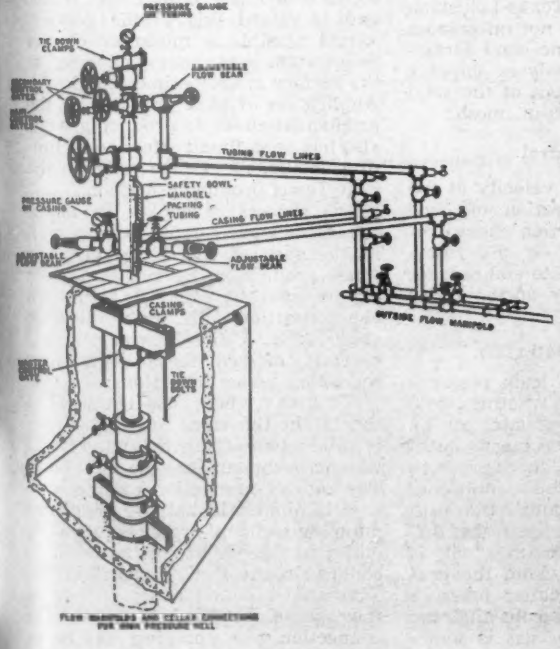
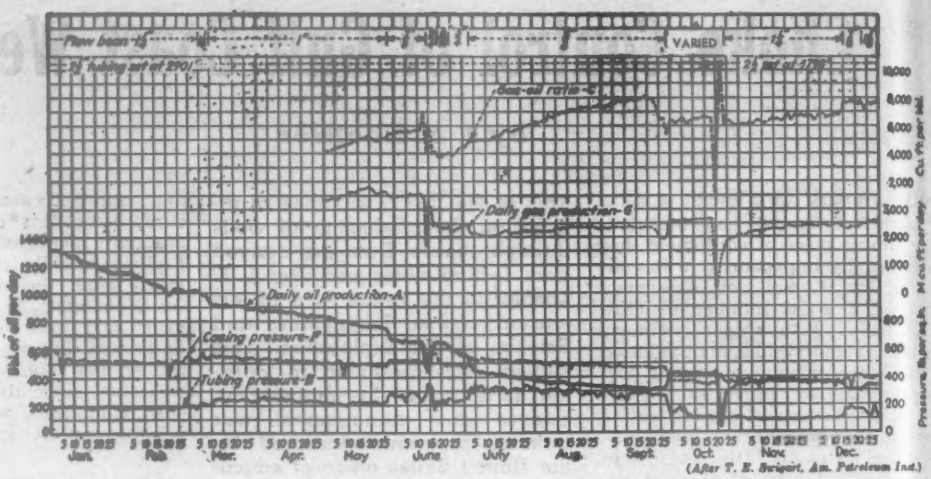


Fig. 1—A typical christmas tree

Fig. 2—Simpler type of high-pressure christmas tree

ing life of a well, and a graphical illustration of such records is given in Fig. 3.

The problem of pressure control while producing through chokes has two distinct phases. The first is concerned with the flow of fluid through the reservoir formation to the well; the other pertains to the behavior of fluid flow from the bottom of the well to the surface. These two phases of the flow problem are different, yet one set of applied conditions must always and simultaneously control both. The problem justifies detailed engineering supervision to insure efficient operations, since oil production secured by natural flow through chokes is the cheapest oil produced.



(After T. E. Swigart, Am. Petroleum Inst.)

Fig. 3—Graphic production record of a flowing well operated under choked conditions

Specific Purposes of Chokes

Before discussing the operational detail of various types of chokes, it is believed a rather full consideration should be given to the effect such equipment has on the various factors and conditions involved in producing wells. These have been generally summarized as follows:

1. To physically control the rate of flow to a set amount.
2. To use the gas energy to best advantage in prolonging the life of the well.
3. To reduce the tendency to sand up or bridge.
4. To reduce sand cutting of screens, perforations, well-head and flow-line fittings, etc.
5. To assist in prevention of premature water encroachment.

Potential Tests

Potential tests have varied in procedure, and no two states seem to follow exactly the same rules. General tendency has been to get away from open-flow tests for determining potential. In East Texas some time ago, the old Van field practice of determining the potential was followed, which involved flowing the well through 2½-in. tubing with an 11/16-in. flow bean in a positive choke. Now the usual practice is to flow the well for 24 hours through a ¼-in. bean of a positive choke, and from this flow determine the normal potential for the establishment of its oil-gas ratio. In cases where potentials are determined in this manner, the christmas tree includes one flow line fitted with an adjustable flow bean for regulating the normal flow, while another flow line provides a ¼-in. "proration" flow bean in a positive choke used only for the potential test.

Sand Incursion

In certain fields the problem of sand is particularly troublesome. Occasionally as much as 30 per cent of the volume of oil reaching the surface is sand. With high flow velocities, sand-laden oils are capable of rapidly eroding valves and fittings of casing heads, thus weakening the metal to the point where it will no longer withstand the high pressure. Means must be quickly devised on wells of such types to minimize the destructive scouring effects of rapidly flowing sand-laden oil and gas. In the Texas-Louisiana Gulf Coast area it is not uncommon to find extremely fine sand formations with screen analyses showing as much as 70 per cent of the sand passing through 0.005-in. mesh.

Sand Control

Reducing the flow velocity at the well bore by application of back pressure with production chokes restricts the tendency of the reservoir sand to disintegrate and reduces the carrying capacity of the fluids for sand.

Gas-Oil Ratio

Regardless of how back pressure is applied to a well, whether by a separator, pressure regulator, or by production choke, such means automatically increase the pressure within the well. This additional pressure exerted against the productive formation reduces the differential pressure so that oil is moved into the well from the producing sand with smaller pressure loss. Ordinarily this means that the rate of flow of oil or gas is somewhat reduced below what it would be under open-flow conditions. A slower rate of flow of the fluids in the reservoir formation with less energy loss often will permit work being done with the expenditure of a smaller volume of gas and a reduction in gas-oil ratio. Thus an increase in ultimate recovery may be obtained. It was stated that the rate of flow was retarded by the application of back pressure; however, this does not always mean that the production of oil will be less. As a matter of fact, in many cases it has been found that the rate of oil and gas production is actually increased.

Effect on Water Encroachment

Erratic and uneven water fingering and encroachment is a serious menace in many Gulf Coast fields, and to retard this to the greatest extent possible, a minimum of pay penetration and heavy choking at the surface are sometimes employed. Application of back pressure by the production choke to producing wells also has been found effective in limiting incursions of edge water in the East Texas producing horizon.

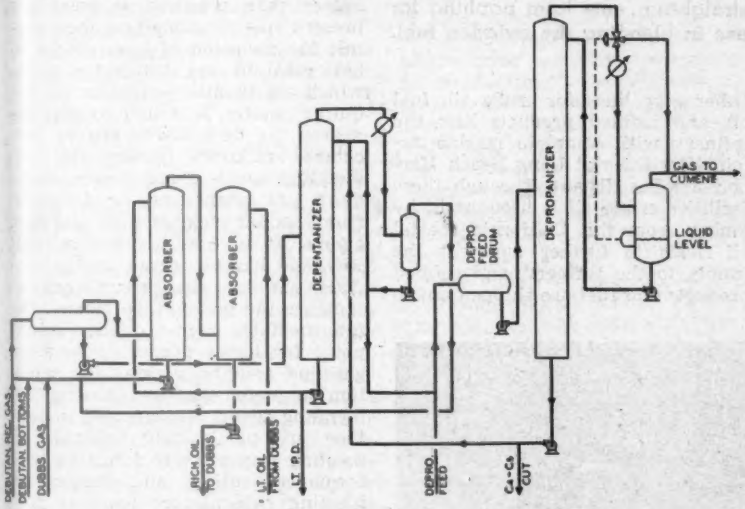
The success of chokes in maintaining flowing conditions in a well in the face of increasing gas and water production depends to a great extent upon the reservoir formation characteristics. J. N. Miles, division engineer for Cities Service Oil Co., recently offered these conclusions regarding water incursions:

"In areas where water underlies the oil in the same sand, the rate of production affects the rate of water encroachment into the well bore. The rate of production can be held to a minimum in both flowing and pumping wells by producing through either surface chokes or bottom-hole chokes. In the East Texas field the additional production per well from the use of bottom-hole chokes in connection with pumping may be as much as 10,000 bbl. of crude oil."

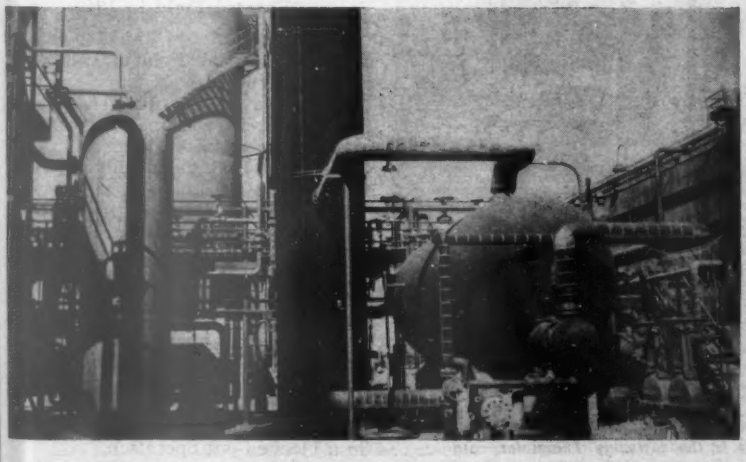
Wilshire Concentrates Refinery And Stabilizer Gases

THE expansion and modernization program recently completed by Wilshire Oil Co., Inc., at Norwalk, Calif., includes adequate facilities for the concentration of all refinery vapors. A large horizontal drum receives the Dubbs gas, debutanizer bottoms and the debutanizer receiver gas, as well as vapors, from the various vessels elsewhere, which are not condensed. The debutanizer bottoms and the vapors separate in this drum so that low-boiling fractions will pass directly to two absorbers operated in series. Liquids are pumped to the depentanizer from which depentanized material for motor fuel is withdrawn. A split stream from this material is led to the first absorber as absorption oil. The second absorber employs a split cut from the Dubbs main column as absorption oil, and is returned as rich oil to the cracking plant. The vapors from the receiver drum and from the second absorber are as follows:

	Primary absorber inlet gas	Secondary absorber outlet gas
Inerts	8.2	10.0
Methane	33.3	40.2
Ethene	4.9	6.5
Ethane	18.3	21.8
Propene	8.7	8.4
Propane	10.3	10.9
C_4	8.2	2.2
C_5 plus	8.1	0.0
	100.0	100.0



Flow diagram of the main operations in the process



Reboiler and piping on fluid catalyst gasoline debutanizer in Wilshire's refinery

Rich oil from the primary absorber is pumped into the gas concentration receiver drum so that vapors easily released from solution can be treated again in the absorption system. The total liquid from the receiver drum is pumped to the depentanizer, a column 7 ft. 6 in. o.d. by 82 ft. high, from which the motor-fuel stocks are removed having the following composition:

C_5	4.4
C_6 plus	95.6
	100.0

Composition of Overhead Cut

All condensable overhead is led from the reflux accumulator to the depropanizer feed drum, which also receives material from the refinery debutanizer overhead. Uncondensed vapors from the depentanizer reflux accumulator pass back to the beginning of the system and enter the large horizontal drum from which vapors are removed to the absorbers. All of the commodity entering the depropanizer feed drum is pumped to the column, 5 ft. 6 in. by 110 ft., where two cuts are made. The overhead cut has the following composition, and which is subsequently treated to produce cumene from the hydrocarbons reacted upon in the catalytic columns.

Depropanizer Overhead	
Methane	2.5
Ethene	2.5
Ethane	15.9
Propene	28.5
Propane	47.5
i-Butane plus	3.1
	100.0

Only the necessary quantity of reflux is condensed from the depropanizer overhead, so that the remainder will flow as vapors to the subsequent process. Complete control of the flow of overhead through condensers and around these units is provided with a three-way valve. This valve is diaphragm controlled, operated by the liquid-level instrument on the reflux drum so that reflux is furnished to a designated level and no more than required. The valve is installed in the overhead vapor line near the reflux condenser bypass line so as to give a minimum amount of lag and fluctuation.

The bottoms from the depropanizer is the concentrated fraction gathered throughout the refinery for alkylate charge. It has the following composition:

Depropanizer Bottoms	
i-Butane	8.4
i-Butene, 1-Butene, 2-Butene	28.6
n-Butane	26.6
i-Pentane, n-Pentane	15.1
Pentene	21.3
	100.0

Additions to Richfields's Watson Refinery Nearly Double Aviation-Gasoline Output

*by Charles C. Day, Jr.**

Three consecutive reconstruction programs have resulted in doubling Richfield Oil Corp.'s original high output of 100-octane number aviation fuel. The additions include combination units, two T.C.C. catalytic-cracking units, an isomerization unit and a cumene unit, and enlarged alkylation and superfractionation units. Cumene is made in what was formerly the polymerization unit of the refinery. An important step in this plant is the exact fractionation of special straightrun cuts from naphtha for use in blending the aviation fuel.

RECENTLY completed additions to the Watson, Calif., refinery of Richfield Oil Corp. have resulted in nearly doubling the company's already high output of 100+ octane aviation gasoline, and has enabled Richfield to maintain its position as one of the leading producers of this vital fuel on the West Coast.

The newer additions to the refinery are the result of close collaboration of Lummus Co. and Richfield engineers in fully coordinating all refinery processes including the combination units, the Thermofor catalytic cracking (T.C.C.) units, the enlarged superfractionation unit, the isomerization unit, the enlarged alkylation unit and the cumene unit.

Richfield's Watson refinery occupies a strategic location in the Los Angeles basin. Much of the crude oil processed is delivered to the plant by pipe line from fields which are but a few miles distant. In addition, Richfield has a trunk pipe line connecting the refinery to important oil fields in the San Joaquin Valley.

Other pipe lines for crude oil, fuel oil, and refined products link the refinery with complete marine-terminal facilities at Long Beach Harbor, 3 miles distant. Through these facilities crude oil is brought in by tanker from the California coastal oil fields to further augment the supply to the refinery, and refined products and fuel are shipped out to distant war theaters and to meet the military, industrial, and civilian demands of northern California and the Pacific Northwest. Richfield's tanker fleet engaged in this service, has made a vital contribution to the war effort since the outbreak of hostilities.

The 100-octane aviation gasoline produced today by Richfield consists of a blend of alkylate, cumene, isopentane, catalytically cracked gasoline and selected straightrun fractions. Alkylate, cumene, and isopentane are blending agents since they have antiknock ratings when leaded higher than required to meet the present specifications and thus permit the inclusion of base stocks of both catalytic and straightrun origin which are themselves below the required quality. It is obvious that the nearer the base stocks are to 100-octane antiknock quality the less blending agent is required and the more 100 octane can be produced from limited quantities of blending agents. It is for this reason that Richfield has pioneered the precise fractionation of straightrun stocks to separate the best for 100 octane, the intermediates from a quality standpoint for lower grades of aviation gasoline and the poorest for rejection to motor gasoline. Among the blending agents alkylate and isopentane are particularly valuable in meeting lean-mixture (cruising performance) ratings and cumene in meeting rich-mixture (combat performance) ratings.

A section of the recently completed Richfield Oil Corp. 100-plus octane refinery near Los Angeles. On the left is the towering Thermofor catalytic cracking unit and on the right are the primary cracking furnaces

Entered Field in 1940

Richfield entered the 100-octane aviation gasoline field in 1940 with the construction of an alkylation unit and a deisopentanizer column to operate in conjunction with an existing debutanizer.

Early in 1941 the dependentanization of the straightrun base stock with subsequent recovery of the isopentane was started. As a result of an intensive laboratory study of the octane number of various straightrun fractionations, the commercial separation of a very sharply cut 195° end point straightrun base stock was inaugurated early in 1942. This was made possible without additional equipment by forcing existing fractionating columns to do double duty in a blocked-out operation.

Another important step taken dur-

*Chief process engineer, Richfield Oil Corp.

ing 1942 was the conversion of the polymerization unit to the manufacture of cumene. The discovery of cumene and the starting of commercial manufacture at a number of refineries throughout the country made possible not only an increased production of over 20 per cent but a tremendous improvement in the rich-mixture or combat performance of 100-octane aviation gasoline.

Early in 1943 an expansion program involving (1) additional alkylation equipment sufficient to more than double production, (2) additional straightrun fractionation equipment, and (3) a butane isomerization unit was completed.

Before the 1943 expansion was completed plans for a second expansion were under way. These plans culminated in the Richfield plant as it is today which includes in addition to the equipment already enumerated, two T.C.C. catalytic cracking units, a new alkylation unit of approximately the same capacity as the original expanded unit, additional superfractionation equipment, and a new boiler house.

The functions of the various units in the refinery in producing 100-octane aviation gasoline are as follows:

Combination Units

The two combination crude-topping and thermal-cracking units were built in 1938. These units, together with previously modernized crude-topping equipment, give the refinery a crude capacity of about 70,000 bbl. per calendar day and sufficient cracking capacity to handle all of the straightrun residuum produced from that amount of crude.

The combination units separate a light straightrun gasoline which is subsequently fractionated into superior base stock for 100-octane aviation gasoline, a straightrun naphtha fraction for reforming, a gas-oil fraction for catalytic-cracking charge stock, propylene for cumene manufacture, butylenes and amylenes in sufficient quantity to fill one of the alkylation units, isobutane and isopentane, and sufficient cracked gasoline to supply a large quantity of all-purpose gasoline for use in the ground equipment of the armed forces, and to meet certified civilian requirements.

On each unit there are two bubble towers and one stripper which fractionate the crude charge into light straightrun gasoline, naphtha for subsequent reforming and T.C.C. gas-oil charging stock. Residuum from this operation together with that produced on the crude-topping units constitutes the charge to the cracking system. Two evaporators, one designated the gas-oil evaporator and the other the vacuum evaporator, prepare a heavy gas-oil charging stock for the DeFlorez cracking heaters. Effluent from the reforming and cracking heaters discharges into the gas-oil evaporator from which the cracked distillate plus the uncracked gas oil passes overhead to the main fractionator where the distillate is removed overhead and the bottoms recycled to the DeFlorez heaters. By the use of a distilled cracking-heater charge, long runs with a minimum of coke deposition are obtained.

The combined cracked distillates from both units is further fractionated to produce C_4 and C_5 cuts, a 200° end-point light cracked distillate and a 200°-400° end-point heavy cracked fraction. The separation of the cracked distillate into light and heavy fractions permits the production of large quantities of all-purpose gasoline without using straightrun stocks.

Thermofor Catalytic-Cracking Units

The two huge 240-ft. high T.C.C. units make a major contribution to the increase in the refinery's output of 100-octane aviation gasoline.

The principal equipment in each of the units comprises two reactors in parallel, one Thermofor kiln, two Jeffery catalyst elevators, a product fractionator, three 600-hp. Ingersoll-Rand compressors, and a product debutanizer (or dependentanizer). Equipment common to both units consists of an absorber, a fat-oil still, a depropanizer, and a spare compressor.

The vaporized and superheated charging stock passes upwards through the reactors countercurrent to the down-flowing catalysts. The vapors pass from the top of the reactor to the fractionator and the catalyst is conveyed from the bottom of the reactor to the top of the kiln. The catalyst passes downward in the kiln through a number of burning sections into which preheated air is introduced in order to burn the carbon which was deposited on the catalyst in the reactor. The heat generated by the burning of the carbon is converted to steam by circulating water through closed coils immediately following each burning zone. The regenerated catalyst is conveyed from the bottom of the kiln to the top of the reactor thus completing the catalyst cycle.

The first of the two units cracks virgin gas oil and the second unit retreats or recracks the partially dependentanized gasoline produced in the first unit. Considerable flexibility is afforded by the choice of catalyst used in the two units. In this particular case the best balance between olefins and isobutane is obtained by the use of natural-clay catalyst in the first unit and synthetic catalyst in the second unit. The use of synthetic catalyst in the second unit also insures the production of an exceptionally high quality base stock.

The purpose of the compressors previously mentioned is to facilitate light-hydrocarbon recovery by compressing the wet gas from 10 lb. to 145 lb. gage pressure.

Sufficient olefins are produced in the T.C.C. units to furnish about one-half of the total quantity of alkylate made in the refinery. This quantity of alkylate is in turn more than sufficient to blend all of the catalytic base stock produced.

Straightrun Superfractionation

The straightrun superfractionation section of the Watson refinery consists of 12 interconnected fractionating columns ranging in size from 2½ to 12 ft. in diameter and in number of bubble trays from 30 to 70.

As a result of the installation of this equipment it may be stated that substantially all of the isobutane and isopentane entering the refinery, plus all of that produced within the refinery, is fully utilized in the production of 100-octane aviation gasoline. The importance of the superfractionation of the base stock used in 100 octane is evident from the fact that without this fractionation the quantity of 100 octane produced would be reduced to 75 per cent of its present volume.

Isomerization

The basic ingredient of 100+ octane gasoline is alkylate, without which commercial production in substantial quantities would be impossible. This important material is produced by the chemical combination of isobutane with olefins in the C_3 to C_5 range. Although isobutane is formed by both thermal and catalytic cracking and, in addition, is present in natural gasoline and crude oil, the total quantity available from all sources is insufficient to balance the olefins produced by cracking. Accordingly, Richfield installed a butane isomerization unit of the Shell vapor-phase type in February 1943.

In this process n-butane is converted to isobutane by passing as a vapor through a bed of catalyst under proper pressure and temperature conditions in the presence of hydrogen chloride. The Richfield unit, although one of the first built, has operated with a minimum of trouble and has consistently produced more isobutane than the plant design called for.

Alkylation

Alkylation facilities at the Watson refinery consist of two large sulfuric alkylation units. The first unit, which was built in 1940 and enlarged in 1942, processes butylenes and amylenes produced by thermal

(Continued on page 128)

Associated Refinery Draws Charge Stocks From Eight Different Refineries

by R. B. Tuttle and Arch L. Foster

Charging 11,000 bbl. of special gas oil per day, drawn from eight operating refineries in the area, this new war plant is turning out large quantities of 100-octane-number gasoline for the air forces. It includes the more recent design of Fluid catalytic-cracking units, in two stages: an HF alkylation unit; an aluminum-HCl isomerization unit; superfractionation and rerun facilities, and the various necessary auxiliary equipment groups. Postwar plans include possible lease or purchase of the plant and its conversion to a complete refinery.

ONE of the major problems of refiners of small and medium capacity, at the outbreak of the war, was that of working out some method by which they might contribute to the supply of aviation and general-purpose fuels and other petroleum products required in such huge quantities. It was realized that successful operation of catalytic cracking, alkylation and other indispensable processes requires at least a minimum crude throughput to warrant construction of the necessary equipment.

A number of Mid-Continent refiners, considering that a mutual interest in the subject could be served best by cooperative effort, united to form Associated Refineries, Inc., of Duncan, Okla. The organizers of the Associated company are: Rock Island Refining Co., Duncan; Bell Oil & Gas Co., of Tulsa, Grandfield, etc.; the W. T. Waggoner estate, Electra, Tex.; Ben Franklin Refining Co., Ardmore, Okla.; Anderson-Prichard Refining Corp., Oklahoma City and Cyril; Cosco Oil Co., Wynnewood, Okla.; LaSalle Refining Co. of Burkburnett, Tex., and Panhandle Refining Co. of Wichita Falls, Tex.

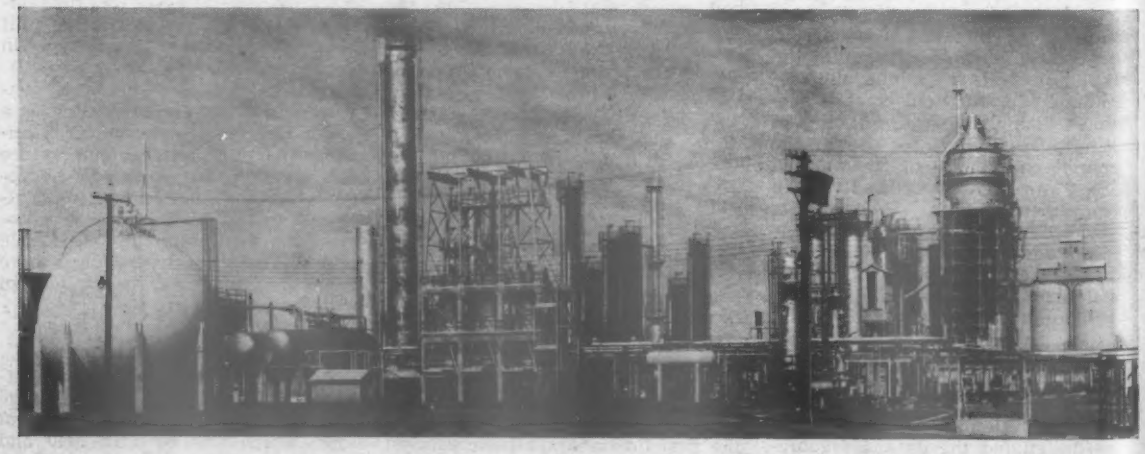
The Associated refinery is at Beckett, Okla. It has capacity of 11,000 bbl. of special gas oil charge stock per day, and is operated by a staff which currently includes about 465 people and will increase to about 500 when all staffs are completed, probably by the end of 1944. The plant was designed in detail by Jones & Laughlin Supply Co.'s engineering department, contractors who built the entire refinery. Basic information and data on the main units and on some of the auxiliary equipment and units were supplied by Universal Oil Products Co., which was also licensing agent for the catalytic-cracking alkylation and isomerization processes.

The plant obtains its charge stock, including mostly special gas oil with some B-B fractions (fractions rich in butanes and butenes) from the various refineries involved and in some instances may obtain some material from outside sources. It is connected by pipe line only with the Rock Island plant, nearby; the remainder of the stock is received in 4,000-gal. and 4,500-gal. tank trucks. Necessarily the specifications of stock quotas so received vary considerably, but all shipments are stored in the same tanks so that the average charge maintains fairly uniform characteristics.

The company is headed by M. Lloyd Freese as president and general manager. Its plant superintendent is Walter D. Manz, with Allen J. Pettigrove as assistant superintendent. The chief engineer is L. R. Lyon; Charles R. McMahan is chief chemist, and Herbert Miller is personnel director.

The plant includes the major refining units required to produce the 100-octane-number superfuels required by the armed forces; Fluid catalytic-cracking unit in two stages; an anhydrous HF alkylation unit and a butane isomerizing unit with anhydrous aluminum chloride as the catalyst. With these units, of course, are combined the gas-concentration unit, steam capacity, storage equipment, water-cooling towers and treating units, product-treating units and other auxiliary equipment necessary in every modern refinery making these products.

Of the more interesting items in the catalytic unit are the several steam generators and the waste heat



View of major units of the Associated refinery: in left foreground are the three contactors of the alkylation unit; center background, the dark-colored towers of the fractionation assembly; right center foreground, the isomerization unit and right background the tall Fluid catalytic-cracking unit

boiler which are incorporated into the unit hookup for the generation of steam for process and power uses within the plant; three separate generating units are incorporated into the layout. One unit, which is located at the No. 1 fractionator, is designed to supply 150 p.s.i. saturated steam at the rate of 34,600 lb. per hour; heat is obtained by circulating the slurry bottoms from the fractionator through the tubes of a shell-and-tube type heat exchanger. Circulation of the slurry is handled with a turbine-driven centrifugal pump which picks up the material from the bottom of the tower, passes it through the exchanger and returns it to the tower at a point above that of the incoming material from the first catalytic reactor. Design figures for the circulation of slurry through the exchanger are given as 53,000 bbl. per day with temperatures running between 500° and 520° F.

Approximately 14,400 lb. per hour of 40 p.s.i. steam is produced by the second generator which obtains its heat from a sidestream at No. 1 fractionator. This stream, taken off at a point above the inlet of the circulated slurry, is pumped with the same type centrifugal as is used to handle the slurry. Rate of circulation for the sidestream through the exchanger is designed at 34,700 bbl. per day at temperatures between 350° and 400° F.; the stream is returned to the tower above the point from which it was removed. Heat for the third steam-generating unit comes from No. 2 fractionating tower by circulation of the slurry bottoms as in the case of No. 1 tower. Heat recovery from the circulation of approximately 14,000 bbl. per day of slurry, which averages about 485° F., provides 8,350 lb. per hour or 40 p.s.i. steam. This figure, as given for the other figures on steam-production quantities, is based upon design calculations which from all indications appear to be reasonably close to actual production. Flue gases from the catalytic regenerator supply the heat for the waste-heat boiler. Ranging between 1,000° and 1,100° F. the regenerator gases are conveyed to the boiler in a refractory-lined steel duct. Design figures show the flue gas volume at 1,970,000 cu. ft. per hour; for this quantity the duct is sized at 60 in. on the inside of the 7½-in. lining. Heating surface in the waste-heat boiler is made up of 30 rows of 1½-in. diameter Griscom-Russell "K-Fin Type RU" tubes which are arranged in tiers of 12 per row. According to design figures 23,000 lb. per hour of 150 p.s.i. steam is obtained from the heat picked up from the gases by this installation. From the boiler the gases pass through the Cottrell precipitators and out a stack to atmosphere. Steam at 275 p.s.i. is generated in the main power plant where five oil and/or gas-fired induced-draft Vogt boilers, having a nominal total rating 325,000 lb. per hour at 300 p.s.i., are installed. Steam from the power house is used to operate the Elliott turbine-driven blower which supplies process air to the catalytic unit in the plant; the blower is rated at 50,000 c.f.m. at 15 p.s.i.

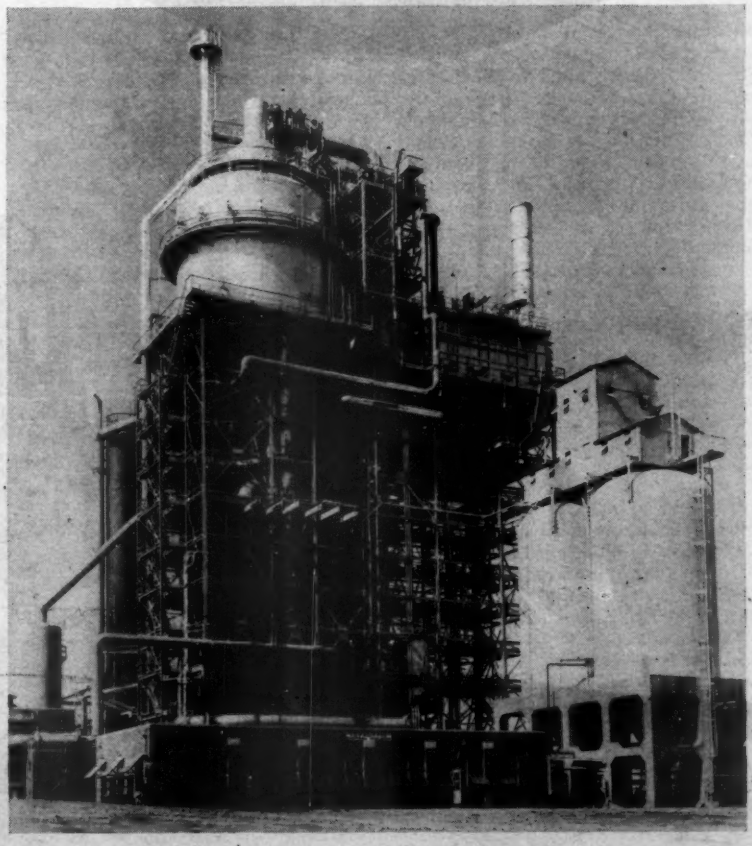
Construction of Reactors

The catalyst regenerator, a vessel 41 ft. in diameter by 73 ft. high, is of carbon-steel construction with a refractory lining throughout its interior; both heads are conical with the top head having a 60-in. i.d. opening to which is connected the duct that conveys the flue gases to the waste heat boiler. Several connections are located in the bottom head for connecting the various refractory-lined conduits to and from the two reactors and to and from a raw oil to catalyst heat exchanger.

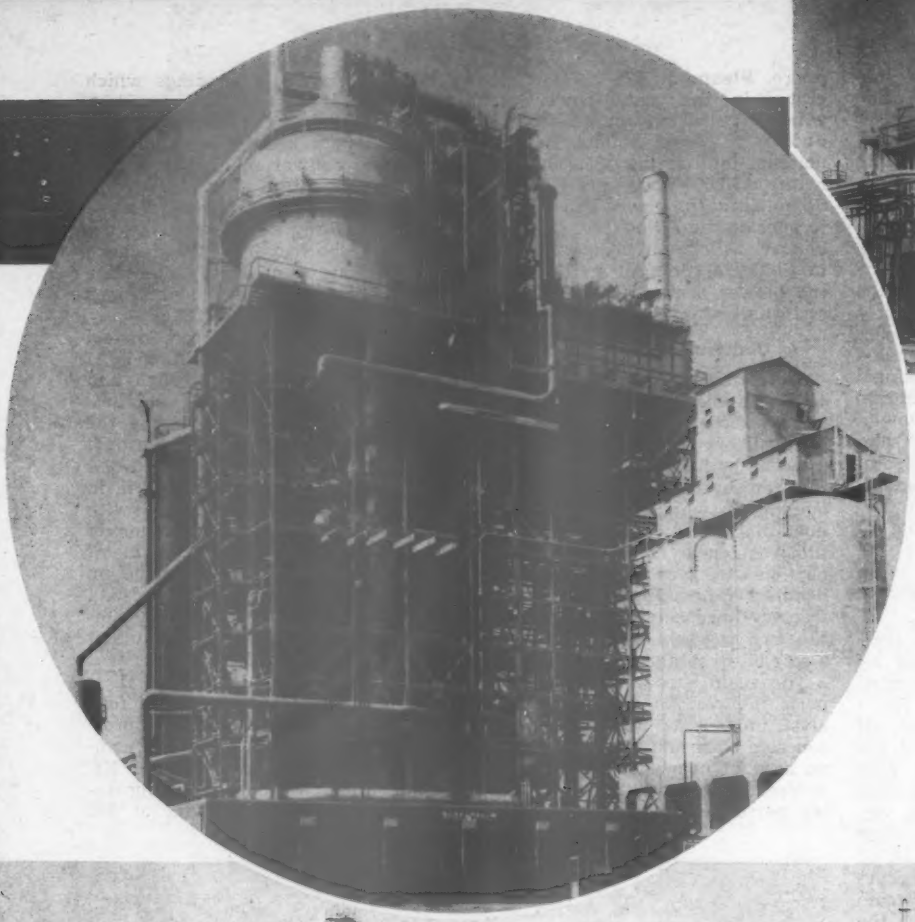
The main structure, which supports the various items in the catalyst unit, rests upon a series of concrete piers and bases that occupy an area of nearly 10,000 sq. ft. An automatic elevator, for the operating personnel, serves 13 of the 16 operating levels or landings which are built into the structure. Each of the 16 levels is provided with a telephone for direct communication with the control room; the system is independent of the other communication systems in the refinery. An idea of the height of the structure may be had from the distance of the flue gas duct center line above the structure foundations which is given as 186 ft.

No. 1 reactor, built of carbon steel with a chromium alloy lining is 21 ft. in diameter by 72 ft. high and has conical heads at top and bottom. Connected into the top of the reactor is a 34-in. unlined steel duct which in turn is connected to No. 1 fractionator. Reactor No. 2, 76 ft. in over-all height, is constructed with an offset in its 16-ft. diameter of the upper section to 14-ft. diameter in its lower section; construction materials are the same as for No. 1 reactor and the top outlet is connected by means of a 24-in. diameter duct to No. 2 fractionator.

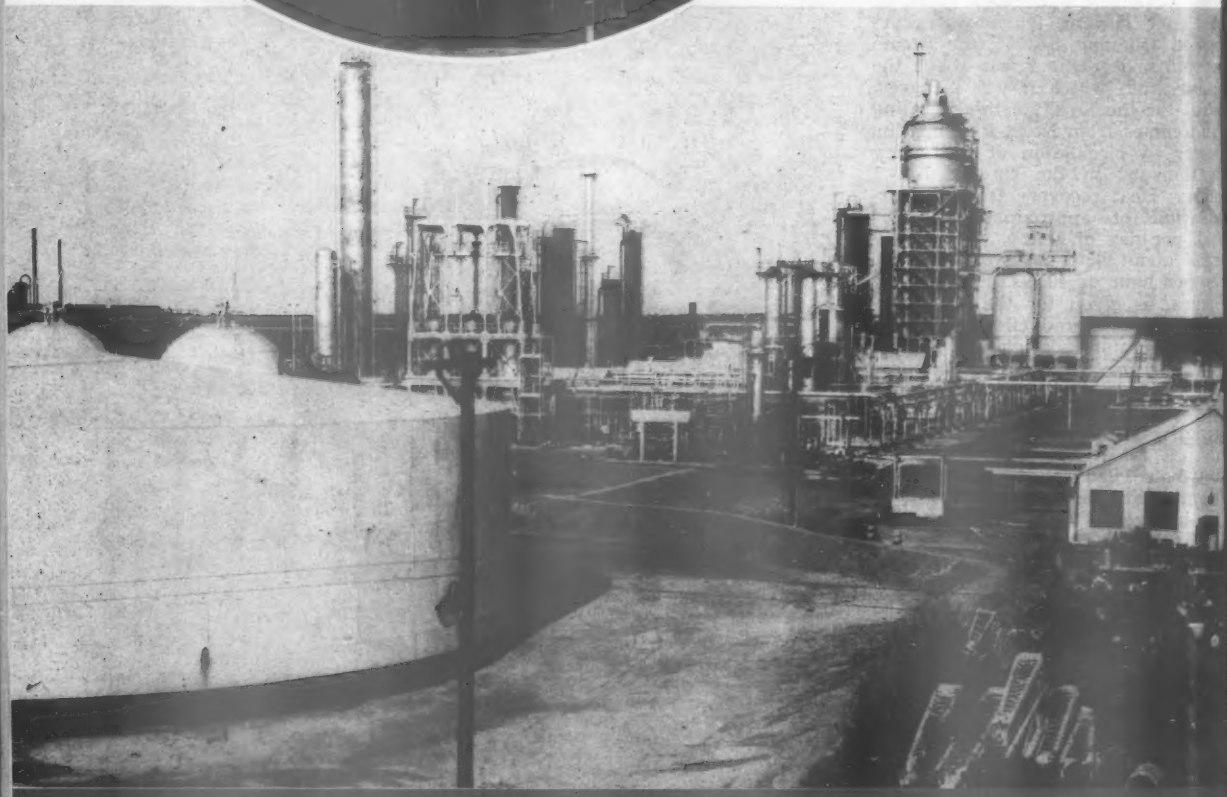
Gas-concentration unit No. 1 is tied into the discharge side of four 600-hp. Cooper-Bessemer compressors which takes the material coming from catalytic fractionator No. 1 and after two stages of compression, delivers the material at 200



Broadside full view of the two-phase catalytic cracker



REPEAT BUSINESS
HAS CONSTITUTED
60% OF OUR CONTRACTS
DURING THE LAST
SIX YEARS



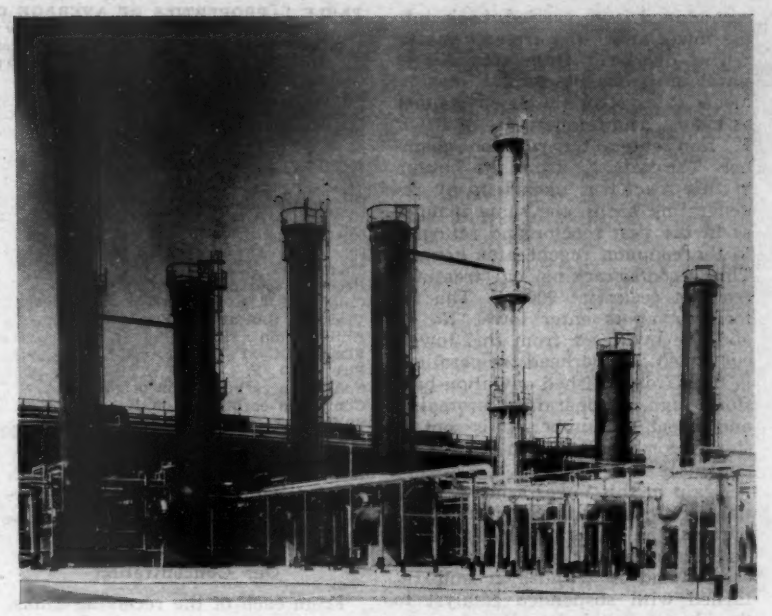
ENGINEERING & CONSTRUCTION DIVISION

p.s.i. Unit No. 2 or the second section of the gas-concentration unit obtains its materials from catalytic fractionator No. 2 in the same manner that No. 1 gas-concentration unit obtains its material. Gas received at unit No. 1 is processed in a 96-in. by 70-ft., 30-plate debutanizer and in a 102-in. by 50-ft., 30-plate rerun column. Included in No. 2 section of the gas-concentration unit are a 6-plate, 54-in. by 25-ft. stripper; a 96-ft. high vessel which has one section that is 48 in. in diameter with 30 plates and another section having 40 plates in a 66-in. diameter. The 30-plate section of this latter vessel is used in absorber service and the other section is used for the stripper. The 30-plate debutanizer vessel is 96 in. by 71 ft. 6 in.; a depropanizer column which has 30 plates is 71 ft. 6 in. high by 66-in. diameter; the dependentanizer, 72 in. by 90 ft. has 40 plates; and a 90-in. by 50-ft. high, 20-plate rerun tower includes the other plate-type fractionators in this section. Incorporated into the treating unit are four carbon-steel packed columns which are designed for 335 p.s.i. working pressure with ⅛-in. corrosion allowance. Packed with a 10-ft. bed of 1-in. carbon Raschig rings, a 42-in. by 19-ft. vessel serves as the pentane base stock mercaptan scrubber. The hydrogen sulfide scrubber also has a 10-ft. bed of 1-in. carbon Raschig rings in a 48-in. by 16-ft. vessel. Except for height which is 26 ft., the mercaptan scrubber is identical with the hydrogen sulfide scrubber; caustic regeneration is carried out in a 60-in. by 15-ft. vessel.

Three No. 50 Stratco water-cooled contactors are set up in the HF unit along with five fractionating columns, a packed acid dehydrator and an acid regenerator. The alkylation stripper, a 78-in. diameter by 50-ft. high vessel, has 20 plates; the isobutane fractionator is 126 ft. by 115 ft. and has 50 plates; depropanizing is carried out in a column which has 30 plates and is 36 in. by 54 ft.; 30 plates in a 48-in. by 70-ft. column make up the debutanizer, and the rerun tower, 48-in. by 50-ft., has 20 plates. Packing to a depth of 12 ft. is used in a 12-in. by 25-ft. vessel for acid-dehydration service.

Acid regeneration is carried out in a 20-plate, 42-in. by 30-ft. high vessel. Two aluminum chloride towers in the isomerization unit carry a 62-cu. ft. bed each of 4-20-mesh material. These vessels, 24 in. in diameter by 20 ft. high, are so connected that they may be operated in series, in parallel, or separately as desired.

The isomerization reactor, packed with a 42-ft. bed of ½-in. Raschig rings, is a 48-in. by 44-ft. vessel that is lined with 1½ in. of gunite



Main towers, gas-concentration unit

One caustic wash tower, 24 in. by 26 ft., is packed full with 1½-in. carbon Raschig rings.

Two fractionating columns, one each in aluminum chloride and hydrogen chloride services, are packed with ½-in. ceramic Raschig rings to a depth of 30 ft. and are 24 in. by 40 ft. Ceramic Raschig ring packing fills the 8-in. by 10-ft. hydrogen chloride absorber.

Operation of Main Units

As indicated above, the Associated refinery includes four main refining units; the Fluid catalytic-cracking unit, the gas-concentration unit, the HF alkylation unit, and the aluminum chloride isomerization unit. The gas-concentration unit breaks down the effluent from the catalytic-cracking unit, and provides in that way the charge stocks for the alkylation and isomerization units.

The Fluid catalytic-cracking unit charges 11,000 bbl. per day of mixed special gas oils from Oklahoma and North Texas crudes mainly. The charge first enters a heat exchanger where heat is picked up from the recycle drawoff from No. 1 tower, then to the catalyst heat exchangers where it picks up heat from hot, regenerated catalyst returning to the cracking system, emerging from these exchangers at about 700° F. It enters the furnace coils at about 690° F.—dropping a few degrees of heat in transfer—and emerges from these coils at about 900° F., to enter reactor No. 1. Immediately before entrance to the reactor the charge vapors are mixed with hot catalyst dropping down from the regenerator hopper and the mix enters the reactor at about 965° F. where the cracking occurs. The major portion of the catalyst drops out from the bottom of the reactor, and is picked up by the regenerator air which burns away the carbon deposited on the catalyst particles, at 1,050°-1,100° F., the major portion of the regenerated catalyst dropping into the storage section of the regenerator hopper. The regenerator gases with small amounts of fine catalyst entrained, go to a waste-heat boiler and make 150-lb. steam therein from the residual heat in the gases. From that unit they go to Cottrell precipitators, where the remainder of the fugitive catalyst is recovered with 60,000 volts or more potential on the electrode plates.

The cracked vapors exiting from the top of the reaction chamber pass to fractionator No. 1, a tower of 16 bubble plates. The overhead from this tower is first-pass catalytic distillate. A heavier fraction is circulated through the lower half of the tower and out of the bottom. A second fraction of this circulating stream goes to a waste-heat boiler to generate more 150-lb. steam and is returned to the tower. Some of this catalyst-laden stream is drawn off as recycle, and joins the stream going to No. 1 reactor, thus regularly returning the catalyst carried into the tower back to the cracking part of the system. Still another stream of light recycle stock is withdrawn from the tower, stripped and storaged as light recycle oil. The hot part of the stream is split into two streams and is circulated through the charge-oil exchanger and through a 40-lb. steam generator, before the two streams are

recombined and carried back into the tower above the drawoff point.

The overhead from this No. 1 tower goes to the second reactor, meets catalyst in the same manner as before, at a temperature of 1,150° F., and enters the reaction chamber. The catalyst from the bottom of this reactor is picked up by regenerating air in the same manner as in the first reactor and returned to the common regenerator hopper. This second cracking, or "treating" reaction occurs at 900° F. The reformed vapors enter tower No. 2, and the overhead from this tower, cut at 240° F. overhead temperature, is final or finished aviation-base stock, high in isoparaffins, aromatics and in octane number. It is sent to storage for blending with other components.

Again in this tower a heavy fraction is circulated through the lower part of the tower, passes through and heats another 40-lb. steam generator, and is withdrawn and returned with suspended catalyst to the charge just before it enters reactor No. 2, a step analogous to that used in the first tower. A heavy gas oil is withdrawn from the side of the No. 2 tower, stripped and sent to a heavy recycle oil storage.

About 200 tons of catalyst is the holdup in the regenerator hopper. The main body of catalyst is stored in two hopper cylinders, each 28 ft. by 40 ft. As the spent catalyst is returned to the regenerator it is designed to reach 955° F. temperature as the first stage of burning off carbon. From the regenerator it comes to contact the charge at about 1,150° F. design temperature. The regenerator gases produce 150-lb. steam in the waste-heat boiler just ahead of the Cottrell precipitators, being reduced in temperature from 1,100° F. to around 400° F. design figures. Bottoms from the No. 1 tower also produce 150-lb. steam in being cooled.

Catalyst from the Cottrell precipitators may return either to the regenerator hopper direct or may be cooled and sent to the main storage hoppers, depending on the requirements and the amounts of catalyst remaining in the active system. A portion of regenerated catalyst is sent along with air or flue gases through the first heat exchangers through which incoming charge oil passes, as mentioned above, to preheat the charge to the first cracking step. This catalyst is returned to the regenerator hopper. A feature of the process is the maintenance of a certain and definite level of catalyst in the lower portion of the reactors, through which layer the incoming charge vapors and catalyst must pass and in which probably much of the cracking reaction takes place. Similarly a definite minimum level or higher is maintained in the regenerator hopper, through which layer the spent catalyst and its accompanying regenerating gases must pass.

TABLE 1—PROPERTIES OF AVERAGE CHARGE STOCKS AND RECYCLE STOCKS

	Raw virgin special gas oil charge to cat. cracker	Cat. cracker first stage recycle gas oil	Cat. cracker second stage recycle gas oil
Gravity	32.5	30.0	27.0
I.B.P., °F.	350	360	400
10 per cent	475	455	452
20	515	472	478
30	542	484	486
40	568	498	492
50	592	514	496
60	620	530	502
70	650	550	508
80	694	580	520
90	724	615	536
Maximum	850	680	586
Recovery, per cent	98	98	99
Color, A.S.T.M. D-155-39T	5	2	1
Viscosity, S.U. at 100° F.	48	36	35
Aniline point, °F.	160	136	96
Flash, COC °F.	210	220	230
Fire, COC °F.	230	245	260
Conradson carbon, % on original	0.045	....	....
Conradson carbon, % on 10% res.	....	0.015	0.010
Sulfur, per cent	0.60	0.50	0.50

Gas Concentration

From each of the receiving tanks, uncondensed vapors pass to the gas concentration system, along with or parallel to the cracked distillate for stripping and/or stabilizing. Both liquid and vapor distillate from the first cracking step receiving tank pass to the first section of the gas-concentrator unit. The vapors enter a compressor and from the low stage according to design quantities 1,400,000 cu. ft. per day of these compressed vapors return to the entrance of No. 1 reactor. Enough fuel gas is burned in a flue-gas generator to make some 40 million cubic feet of flue gas per day, which is mixed with air to give regenerating gas of the required oxygen content during a starting-up period.

The compressed gas from the high-pressure stage passes to a cooler, to which the liquid from No. 1 rundown accumulator is introduced. The total liquid formed here, including that condensed from the 50-lb. compressed vapors, bypasses the second compression stage where the uncondensed vapors reach about 205 lb., but join the compressed vapors in the second cooler, from which the uncondensed vapors pass the upper part of the debutanizer. The liquid from No. 2 cooler enters the lower part of this tower, and the C_4s go overhead. The debutanized first-stage cracked distillate enters a rerun tower from which charge stock for the second or treating reaction stage is taken overhead, while a heavy naphtha suitable as blending material for motor fuel is taken off the bottom.

In the second section of the gas-concentration unit the uncondensed vapors from the No. 2 reactor enter the low stage of the compressor and are raised to about 50 lb. pressure. The liquid products from the No. 2 reactor fractionator passes to the absorber as absorber oil. Overhead from this stripper joins the compressed vapors from the low stage of the compressor, enters the cooler, and some liquid is withdrawn from the rundown from this cooler. This condensate bypasses the high stage of the compressor,

TABLE 2—PROPERTIES OF FIRST AND SECOND-STAGE PRODUCTS AND AVIATION ALKYLATE

	Cat. cracker first stage make charge to second stage	Depentanized cat. cracker second stage make base stock	Aviation alkylate
Gravity	54.0	46.0	70.5
I.B.P., °F.	102	158	120
10 per cent	137	188	175
20	138	198	193
30	153	209	205
40	174	227	212
50	212	246	216
60	252	262	218
70	278	274	220
80	300	288	224
90	323	302	232
Maximum	352	330	324
Recovery, per cent	99	99	99
Loss, per cent	0.5	0.4	0.6
Color, A.S.T.M. O-156-38	+20	+28	+30
R.v.p., p.s.i.	7.5	1.8	4.2
Sulfur, per cent	0.08	0.08	0.005
Octane 1-C clear	78.0	83.0	92.0
Octane 1-C + 4.6 cc. TEL	87.0	91.0	Iso + 1.35
F-4 rating + 4.6 cc. TEL	98 S/M	S + 0.75	S+ 3.0
Copper dish gum mg./100 ml.	20	4	1
A.S.T.M. gum, mg./100 ml.	1.3	0.6	0.2

TABLE 3—PROPERTIES OF MOTOR NAPHTHA AND ALKYLATE BOTTOMS

	Motor naphtha, combined naphthas from first and second stage—cat. cracker	Alkylate bottoms
Gravity	35.0	52.0
I.B.P.	340	330
10 per cent	356	344
20	360	352
30	363	360
40	367	367
50	370	370
60	374	377
70	378	386
80	384	402
90	394	448
Maximum	426	585
Recovery	98	98
Loss	0.5	0.5
Color, A.S.T.M. D-156-38	—16	—16
Octane, MM clear	75	....
Octane, MM + 3.0 cc.	82	....

TABLE 4—PROPERTIES OF CATALYTIC PENTANES, ALKYLATION CHARGE, ISOMERIZATION CHARGE AND ISOBUTANE PRODUCT

L.V., per cent:	Catalytic pentanes to storage	B.B. charge to alkylation	Normal butane charge to isomerization	Isobutane make from isomerization
Propanes and propenes	....	2.0	trace	0.4
n-Butane	....	20.0	99.6	52.0
i-Butane	....	42.0	....	47.0
Butenes	....	34.0	....	....
Isopentane	72.0	2.0	0.4	0.6
Pentenes	18.0	....	....	....
n-Pentane	7.0	....	....	....
Hexanes plus	3.0	..	....	....

through which the uncondensed vapors from the low-stage cooler pass and are raised to about 200-225 lb. pressure, which stream joins the liquid from the low-stage cooler in the high-stage cooler from which additional liquid is withdrawn to the main stripper which is built as the lower section of the tower which contains the absorber section. The stream to the high-stage cooler just referred to is joined also by the C_3s and lighter from No. 1 gas-concentration unit. The overhead gas from the high-stage cooler enters near the bottom of the absorber tower, is robbed of heavy components by the absorber oil—the heavy fraction from the stripper bottom, made from No. 2 reactor fractionator overhead liquid—and the unabsorbed gases pass to plant fuel lines. Fat oil from the absorber bottom may be stripped in the stripper tower, a portion of it may be recycled to the cooler system for the high-stage compressor. Bottoms from this stripper, which include the liquid from the low and high-stage coolers and the material stripped from the compressed gases by the absorber oil, pass to a debutanizer tower from which C_4s and lighter are taken overhead. Debutanizer bottoms are relayed to a rerun tower, from the bottom of which is taken a naphtha fraction, a portion of which may be recycled to the top of the absorber to augment the absorber-oil supply, the remainder being taken off as heavy naphtha for use as motor-fuel blending stream.

Tops from the debutanizer are stripped of propane after being joined by the effluent from the isomerizer unit and receiving a caustic wash. Bottoms from this depropanizer are the B-B—butanes-butenes—cut or fraction which is charge stock for the alkylation unit outlined later. The overhead from the stripper for the debutanizer bottoms enters a depentanizer tower from the top of which pentanes are taken. The bottoms from this tower are finished base stock for 100-octane number aviation-fuel blending. The pentanes overhead from this base stock stripper tower is split into isopentane overhead and normal pentanes, etc., bottoms.

Alkylation Unit Operation

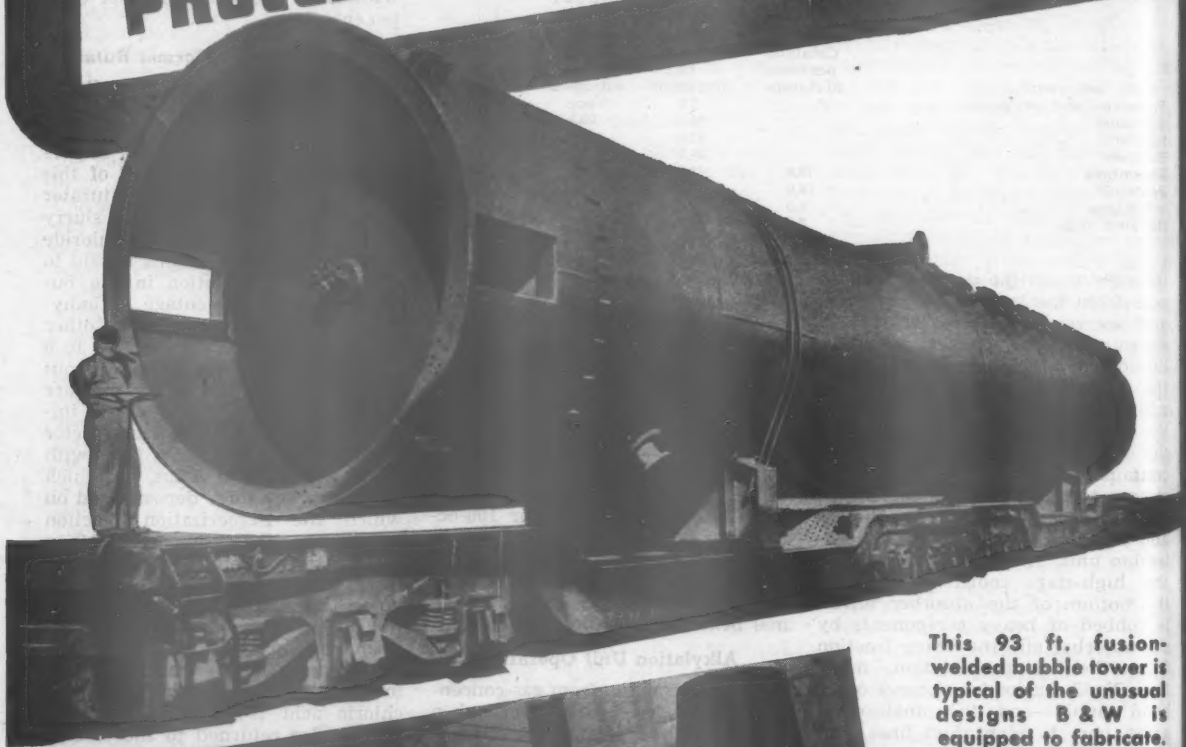
The B-B fraction from gas-concentration unit No. 2 passes through a caustic scrubber to wash out hydrogen sulfide, then is washed with another batch of caustic to remove mercaptans, passing through Raschig ring-packed columns in each case, countercurrent to the washing solution. The mercaptan-fouled caustic solution is heated in a third Raschig ring-packed tower to decompose the mercaptides and regenerate the caustic which is reused repeatedly.

This B-B cut contains about 50 per cent isobutane, and is combined with the recycle isobutane so that as the combined charge reaches the reaction zone the ratio of isobutane to olefin in the charge is about 8:1. The charge is mixed with the catalyst, liquid anhydrous hydrofluoric acid, in the proportion of 60 volume parts of acid to 40 parts of hydrocarbons and reacted while passing through the three centrifugal contactors, the temperature being kept low, about 90°-95° F. in summer. The contact time is said to be about 20 minutes, and practically all olefins in the charge are used up during passage through the contactors. The effluent from the contactors is settled to separate spent acid from hydrocarbon; the hydrocarbon material is fractionated to separate normal butane which passes to the isomerizer, alkylate of aviation grade, and heavy alkylate bottoms which may go to motor-fuel blending storage or to the cracking unit for recycle. The aviation alkylate passes to storage, after passing through bauxite-packed towers to remove the last traces of hydrofluoric acid catalyst, to be blended with other 100-octane-number components.

Isomerization of Normal Butane

Normal butane from the alkylation-unit rerun towers and from any other source which may be available, contains 95-98 per cent of normal butane. About one-half of this stream is bypassed to the saturator where it picks up and forms a slurry with the $AlCl_3$—aluminum chloride—catalyst, much of which is said to go into actual solution in the butane. A small percentage of anhydrous HCl is also added. The other branch of the stream is heated to a temperature which will give about 180° F. temperature to the mixture and the two streams are mixed, immediately passing into a reactor chamber. This chamber is filled with ¼ to ⅜-in. quartz chips, on which the slurry or sludge deposits and on which the isomerization reaction takes place. The entire mixture then passes to an aluminum chloride tower which serves as a sort of guard tower to trap out most of the catalyst, which then passes back to the reactor along with some normal butane. The isobutane then goes to a tower from which the hydrochloric acid is removed overhead and is also returned to the slurry-forming operation as recycle. The isobutane passes from the bottom of this HCl recovery tower to a caustic scrubber and thence to the alkylation operation, entering the stream of material from the debutanizer overhead on its way to the alkylation system. As operated in this plant about 45 per cent of the normal butane is converted to the isomer per pass, the remainder being recycled as outlined previously. The entire alkylation and isomerization units may be evacuated to a clean-up area where, in case of accident, all acids and dangerous chemicals may be neutralized without damage to equipment or personnel. The usual precautions for neutralization of HF and HCl especially are taken, the last traces of HF being neutralized with solid bauxite. Typical

Today's PROCESS EQUIPMENT PROBLEMS



This 93 ft. fusion-welded bubble tower is typical of the unusual designs B & W is equipped to fabricate.

Monster elbow connection and header produced by exclusive B&W forging method — an example of complicated fabrication.

J-487

SOLVED BY B&W

No technical problem is too difficult, no fabricating job too complicated for B&W when it comes to providing process equipment for today's requirements. That's because designing and building pressure vessels, drums, tanks, towers, tubes, piping and related products is a major activity at B&W—and has been for many years.

Here practical solutions for many problems are constantly being developed—solutions for new problems encountered in the application of high pressure, high temperature equipment for producing "ingredients of victory". In the course of these developments, B&W engineers have created new manufacturing techniques that save time and critical materials without sacrificing safety or quality.

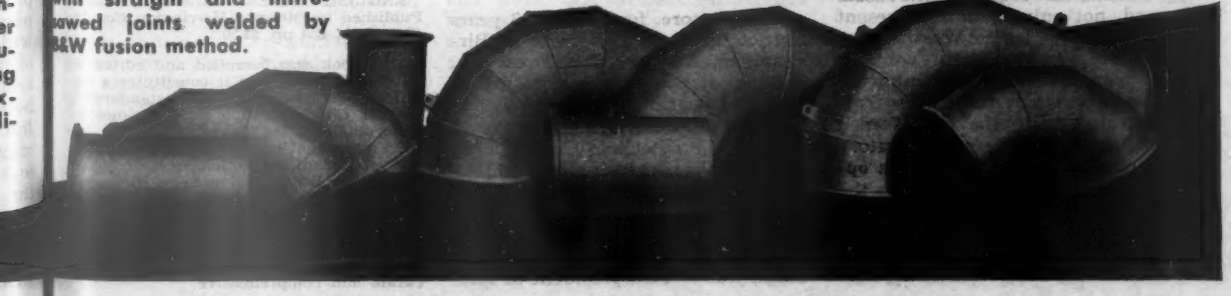
Any requirement for processing equipment can be brought to B&W with confidence of getting sound engineering and finished products of established efficiency and economy.

B&W Streamlined Openings in Pressure Vessels reduce stress concentration; permit lighter weight construction with complete safety.

Reaction chambers with collecting headers designed and fabricated by B&W for oil refinery.

BABCOCK & WILCOX

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK 6, N. Y.



Vapor Piping of Alloy Steel with straight and mitre-sawed joints welded by B&W fusion method.

charge stock and product inspections are given in the accompanying Tables 1 to 4.

Laboratory and Organization

The laboratory includes all the customary inspection and analytical equipment necessary for keeping check on operations and products from a refinery of this type. The staff includes 44 persons. There are two supervisors, seven analytical chemists, three fractional distillation operators, three experimental knock engine operators, three or four laboratory technicians, and others assigned to various special or routine duties. The antiknock engine laboratory, a most essential feature of such laboratories, includes three engines, one equipped to test motor and other fuels according to the standard A.S.T.M. procedure; one to operate on the so-called 1-C method, and one on the highly involved and complicated 3-C method, so important for testing the superfuels used in combat, bomber and other military-plane engines.

The operation of the plant has been very successful, its operators claim. The initial run on synthetic catalyst lasted for 83 days before shutdown for cleanout and modifications. By early September the company had shipped 1,000 tank cars of 100-octane-number aviation fuel, along with other products.

Postwar Plans

It is understood that postwar plans have been studied for some time. Under its war contract, Associated has the option to purchase the plant within a specified time after the war ends. Defense Plant Corp. has approached Associated regarding its plans to buy and/or lease the plant. Whether the plan be to lease the plant at the close of the Pacific war or to buy, either would contemplate the laying of product lines to tie into existing product lines now leading out of the Tulsa area. Other possibilities would be the adding of topping and thermal cracking units, and the transportation of crude to the plant to do a complete refining operation.

If economics warrant it, the company under a postwar plan could assume the proportions of a small major company, Associated officials say. Crude-oil requirements seem assured, not only from the present suppliers but from West Texas through major pipe lines.

The personnel of the plant were for the greater part trained for their specific duties, on the job. Women have been trained for laboratory technicians such as gas-analysis operators, and as "board men" on the various units. Women have also been used as loaders on the truck-loading dock.

To meet the need for housing new employes, 130 new housing units were built. A complete program for employe welfare has been instituted, including life insurance, hospitalization and special family benefits.

Richfield's Refinery Nearly Doubles Output

(Continued from page 113)

cracking and reforming. The second unit was built in conjunction with the 1944 expansion program and processes butylenes and amylenes produced by catalytic cracking. The required isobutane feed for both units is obtained from straightrun fractionation, from n-butane isomerization and from both thermal and catalytic cracking. The two units are interconnected in such a manner that isobutane and olefin stocks can flow from either unit to the other, or to and from plant storage, so as to take full advantage of stocks and equipment available.

Steam at 600 lb. per sq. in. is generated in two new Combustion Engineering Co. type VU-steam generating units, supplying ample additional steam for the refinery expansion. Equipped with the latest types of control, the units are of the outside, semienclosed type, gas fired but so constructed that oil may be substituted in case of gas shutoff.

The refinery electrical equipment was substantially increased by the addition of a new 11,000-2,300-volt main substation and two secondary substations for reducing the primary power from 2,300 to 440 volts for the smaller units and for lighting purposes. A total of 45-kw.hr. of power was added to the existing refinery load of approximately 12,500 kw.-hr. needed for operation of the older part of the plant.

The total fresh water for refinery requirements is approximately 7,000 bbl. per hour of which two newly drilled wells are supplying about 1,500 bbl. per hour. The plant's cooling tower capacity has been increased by the addition of a 40,000-g.p.m. induced-draft unit bringing the total cooling capacity to 110,000 g.p.m.

J. W. Basore, for the past 3 years district lubricating engineer at Birmingham, Ala., for The Texas Co., is head of the new lubricating-oil department of Mid-Continent Petroleum Corp. Basore, a graduate of Alabama Polytechnic Institute in mechanical engineering and of University of California in petroleum engineering, will reside in Tulsa.

George R. Gibson, Richfield Oil Corp., was elected president of Midland (Tex.) Geological Society at its annual meeting. **Leo J. Newfarmer,** Shell Oil Co., Inc., was chosen vice president; **John Hill,** Union Oil Co. of California, secretary-treasurer; **Addison Young,** Phillips Petroleum Co., program chairman.

Joseph Canon, a member of Gulf Oil Corp.'s geological staff in West Texas for the past 5 years, and during the 2 preceding years in North Texas for the same company, has resigned to do independent geological work, with his office in Midland, Tex.

Lt. Glenn Dewayne Hawkins, consulting geologist of Tulsa, who served on the advisory staffs of Adm. William Halsey and Gen. Oscar W. Griswold, from each of whom he received citations, has been transferred to the Eighth Naval District headquarters, in New Orleans, where he is now on duty. Hawkins saw action at New Caledonia, Guadalcanal, New Georgia, Rendova and Bougainville. Admiral Halsey often consulted him concerning coral reefs before ordering construction of an air strip.

BOOKS

FUNDAMENTAL RESEARCH ON OCCURRENCE AND RECOVERY OF PETROLEUM. 1943. Published by American Petroleum Institue, 50 W. 50 St., New York.

This is the first of a series of annual publications containing all papers relating to the institute's important program of fundamental research on occurrence and recovery of petroleum. The book also contains a complete bibliography of all previous papers published on each project since its inception—including, in some cases, a supplemental bibliography relating to the particular work.

CRITERIA FOR DETERMINING OIL FIELD'S SUSCEPTIBILITY TO SECONDARY-RECOVERY METHODS. Published by American Petroleum Institute, 50 W. 50 St., New York.

This volume is sponsored by the institute's standing subcommittee on secondary-recovery methods (Paul D. Torrey, chairman) and is a supplement to Secondary Recovery of Oil in the United States, a book published by the institute in 1942. It contains all the papers delivered at the symposium on secondary recovery at the institute's 24th annual meeting in 1943, as well as the most comprehensive bibliography on secondary recovery yet published.

ENGLISH-CHINESE NOMENCLATURE. Published by Marmon-Herrington Co., Indianapolis. 238 pp. $2.50.

This book was compiled and edited by Calvin C. Chang, and it constitutes a significant contribution to the standardization of Chinese automotive terminology. According to the foreword, there has been a long-felt need in China for authoritative tecchnical dictionaries, of which few are available and none is quite satisfactory. In the absence of standard translations, modern technical terms are usually coined at random and largely influenced by individual idiosyncracy. This new glossary succeeds in being both accurate and comprehensive.

PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

Metals in the Boiler Plant

A SUMMARY of advances in metals of interest to the steam engineer is recorded not solely for immediate use, but also as a stimulus, suggesting possible applications at present and in the future.

Steel castings resistant to heat and corrosion are being made in America from steel containing 10 to 14 per cent Ni, 23 to 28 per cent Cr, 0.2 to 0.45 per cent C, 0.2 N (max.), 1.75 per cent Mn (max.) and 1.75 per cent Si. (max.) The tensile strength is 35.7 tons per sq. in., and elongation 4 to 12 per cent in 2 in.

Electrodeposition of brass on stainless steel and monel metal is carried out in a nickel chloride solution acidified with HCl. The work is the cathode, using 6 volts that will apply 50 to 70 amp. per sq. ft. A short reverse treatment in the solution gives a slight etch and better band.

Chromium vanadium tubes used in radiant superheater corroded severely. This is caused by flame impingment. It was found that an increase in air at the furnace wall eliminates flame impingement.

Results of corrosion tests showed that 18-8 stainless steel with molybdenum was not attacked by flue gases, although if alloyed with titanium and columbium it corroded. Little injury was done to 25-12 chromium nickel steel.

A new method of electrically welding tube strip into tubes is a combination of resistance welding and hammering. The current is supplied by disk electrodes, and the machine comprises a pneumatic or electric-driven hammer between electrodes and edges to be joined.

Stainless steel is suggested for turbine rotors, buckets and nozzles, stellite for valve trim, and special cast-iron interior packing to reduce corrosion. A method of testing metal consists of plunging it into or coating it with a thin oil-soluble fluorescent agent. Excess liquid is washed off and coated with fine powder. The part is then studied under ultra-violet light.

A new steel with 0.7 to 0.9 per cent Mn, 0.2 to 0.3 per cent Si, 0.15 to 0.25 per cent Mo, and 0.2 to 0.7 per cent C replaces chromium vanadium steel for tubes. Steel should also contain 0.2 to 0.5 per cent Cu. Seamless tubes (6 ft. by 60 ft.) are rolled radially with rolls acting upon internal and external surfaces. Longitudinal movement is accomplished by setting the roll axes obliquely.

Strong cast-iron resistance to heat contains 3 to 3.3 per cent total C, 0.3 to 0.5 per cent Cr, 0.6 to 0.8 per cent Mn, 0.3 to 0.5 per cent Mo, 1.0 to 1.5 per cent Ni, and 1.2 to 1.7 per cent Si. Good results were obtained as regards mechanical properties and growth at 1,212° F.

Turbine cast parts are being made from special molybdenum and chromium steels. Various heat treatments for the different steels are necessary.

A tin-free gear bronze consists of 90.5 per cent Cu, 7.5 per cent Sb, and 2.0 per cent Ni. It is especially useful with thin-walled bushes and thin-sectioned blanks, and with centrifugal castings.

Low-alloy steels are replacing high-alloy steels for many purposes. A chromium-molybdenum-iron alloy is used for parts exposed to corroding conditions in Germany. It has 22 per cent Cr, 1 to 3 per cent Mo, less than 0.1 per cent C, remainder iron.

Chromizing is designed for high wear and corrosion resistance. Nickel in austenitic heat resisting steels is being replaced by nitrogen in Germany. Protective coating of steel, zinc and wood by spraying on a molten resin is a Swedish proccess.

An abstract: L. Sanderson, Steam Engineer Vol 13, Dec. 1943, pp. 76-78. Taken from Metals & Alloys of April 1944.

Lest We Forget—Vital Manganese

THE vital importance of manganese in the manufacture of steel, cast iron, malleable iron, alloy steels and irons, and in fact all ferrous metals, has been forcefully brought to our attention by the war. The average amount of manganese required for each ton of ferrous metal is about 13 lb., and as yet no substitutes have been found. Manganese is universally used as a scavenger agent in making sound, clean steel or iron castings or products. In addition it is useful in low-alloy steels (1.1-2.0 per cent) and in the "world's toughest steel," namely Hadfield's manganese steel (12-14 per cent). Our lack of manganese production could well have been disastrous at the beginning of the war had not stock piles amounting to about 2,000,000 tons of foreign manganese ores (in the U.S.) been available.

California, and probably other states, has risen to the stern situation by making exhaustive searches for domestic manganese ores. Bulletin 125 of the State Division of Mines of the Department of Natural Resources of the State of California, entitled, "Manganese in California," was published in December 1943, under the direction of Olaf P. Jenkins. During peacetime we tend to neglect such developments and hence these studies were put into a permanent book form. The 387 pages and a large geologic map of California showing manganese properties, comprise an extensive discussion of the situation including even a 110-page tabulation of claims. It is hoped that the use of local mines and ores will be supported during peacetime by the manufacture of electrical dry cells.

The petroleum industry is one of the largest users of low-manganese steels, in the form of oil-well casing, tubing, and sucker rods.

Metallurgical Terms

Finishing Temperature

Finishing temperature is the temperature at which hot working or forging must be completed. Hot working is conducted in the solid solution or austenite area of the iron carbon diagram, and the hot working must be finished before the part has cooled to a temperature lower than the austenite area.

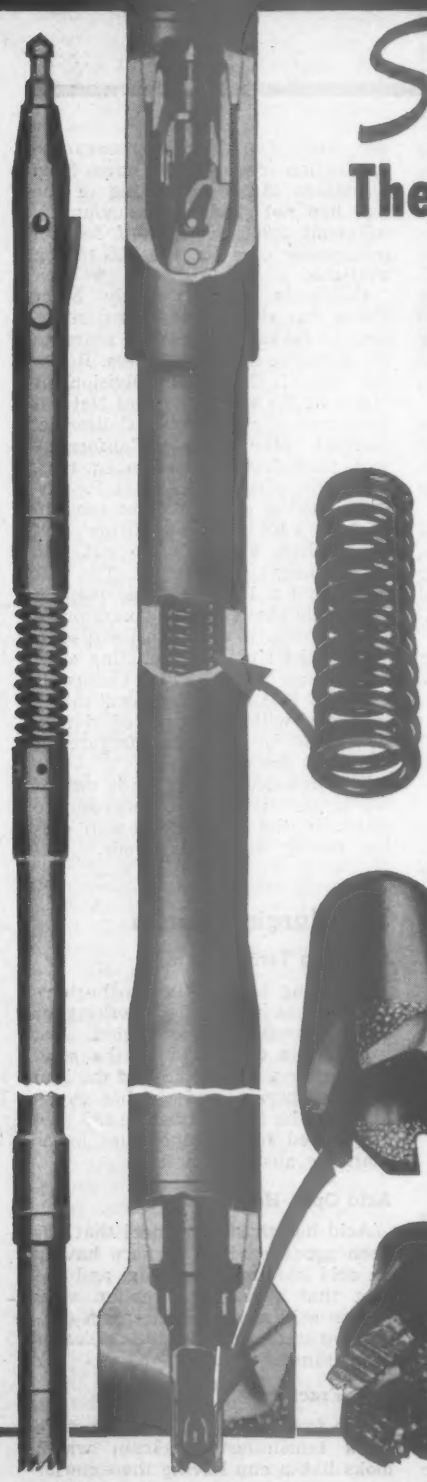
Acid Open-Hearth Steel

Acid hearth steel is steel that has been produced in a furnace having an acid bottom and lining, and the slag that covers the molten steel has an acid reaction. The main constituent of an acid lining is silica or plain sand.

Cup Fracture

Cup fracture is a type of fracture in a tensile-test specimen which looks like a cup having the exterior portion extended with the interior slightly depressed.

FOR BEST RESULTS IN *Wire Line* CORING



Specify

The Well TRIED and PROVEN

REED 'BR'

PATENTED

***The* PROTRUSION REGULATOR SPRING** *CONTROLS THE CORE CUTTER HEAD PRESSURE ON THE FORMATION TO GIVE BETTER CORE RECOVERY IN—*

- *HARD FORMATIONS*
- *SOFT FORMATIONS*
- *MEDIUM FORMATIONS*

***The* REPLACEABLE CORE CUTTER HEAD** *IS INSPECTED FOR WEAR BEFORE EVERY CORE IS CUT AND IT IS REPLACED AS REQUIRED FOR HIGHEST EFFICIENCY IN CORE RECOVERY.*

AT **ANY DEPTH** YOU WILL GET BETTER DRILLING EFFICIENCY AND BETTER CORE RECOVERY WITH THE REED "BR."

RETRACTABLE CORE BARREL

2-3-4-WAY FISHTAIL TYPE BITS FOR SOFT FORMATIONS

ROCK CUTTER BITS FOR HARD FORMATIONS

Reed

ROLLER BIT COMPANY
HOUSTON 1, TEXAS

NEW EQUIPMENT

Developments by Manufacturers Designed to Facilitate Operations of Petroleum Industry

Polan Borescopes for Internal Surface Inspection

ORIGINALLY designed for the internal surface inspection of gun bores, Polan Borescopes, manufactured by Polan Industries, 1219 Tenth Ave., Huntington, W. Va., are now available for use by private industry.

Borescopes make the surface of long bores accessible to the human eye in order to inspect for minute cracks or other faults which may cause failure in operation.

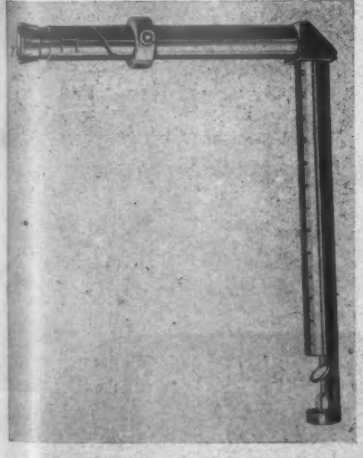
Borescopes are recommended by the manufacturers particularly for close scrutiny of internal surfaces of bored engine shafts, tubular bodies, hydraulic and other cylinders, etc., and will cover a diameter range from 13/16 in. to 9 in., and a bore length up to 30 ft.

The instruments combine the qualities of a highly corrected lens system and of excellent interior illumination with the demand for rugged design which is necessary for everyday machine shop use. The instruments will supply a clear and magnified view of bore surfaces.

A tilted mirror placed in front of the objective furnishes a perpendicular view. This mirror is made from stellite and can be directed toward any surface element to be subjected to closer scrutiny.

The objective image is carried through the instrument tube by several sets of intermediate anachromats, the number of which depends upon the length of the borescope.

The eyepiece is adjustable to individual eyesight and varying work piece diameters.



A borescope with right angle eyepiece extension

The system is highly corrected for chromatism and maximum definition in order to eliminate eye strain and fatigue which may otherwise result from the continuous inspection of the large areas for minute details. The light source is built into the head of the borescope. The tubular bulb used for smooth and evenly distributed illumination of the entire field is concealed to the eyes of the observer by the mirror located in front of it.

Shorter borescopes which are furnished in one unit are wired internally with the cord connector located conveniently next to the eyepiece. The light of these borescopes is operated on low voltage and a 115-volt AC transformer is furnished as standard equipment.

Borescopes from 6 to 30-ft. lengths which are furnished in separable units are operated on 115 volts with the cord connecting directly to the lighting attachment.

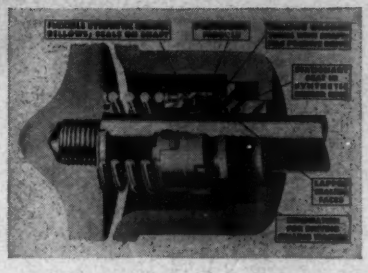
Interchangeable heads with increased mirror and bulb capacity have been furnished to adapt the borescope to larger tube diameters than originally planned. Other heads have been designed for inspection of the end of blind bores, etc.

In cooperating with industry, a number of special borescopes and a wide variety of special attachments have been developed, which are described in a bulletin obtainable upon request.

Bellows-Type Shaft Seal

THIS new mechanical seal eliminates stuffing box leakage and provides sealing on centrifugal pumps, refrigeration compressors, speed reducers, rotary pumps, agitator shafts and many other rotary sealing applications. It has already been field-tested on many services and is giving trouble-free performance at both high speeds and high pressures.

The John Crane shaft seal is furnished as a complete sealing unit, ready for use, and is simple and easy to install. Basically, it consists of three major parts: (1) A flexible synthetic-rubber bellows, the tail end of which grips and seals along the shaft; (2) a stationary floating seat, held in a synthetic-rubber sealing ring; and (3) a positively driven sealing washer, which turns with the shaft and is held against the stationary seat by spring pressure. The contacting faces of the washer and seat are lapped to form a leakproof seal.



Sectional view of John Crane shaft seal installed in a centrifugal pump—a typical application

An exclusive feature is the flexing head of the bellows, which offers no resistance to the spring. This design allows the sealing washer to remain in contact with the seat as the sealing faces wear, and provides automatic compensation for shaft vibration and end-play. A protecting ferrule, fitting the shaft loosely, guides the flexing bellows head and prevents the synthetic rubber from contacting the shaft. There is no compression packing to freeze to the shaft and cause trouble.

The stationary floating seat used in most installations is held in a synthetic-rubber holding ring as illustrated. This construction permits easy insertion, prevents stress distortion of the sealing face during installation and allows the face to be lapped before insertion, thus eliminating the difficulties involved in lapping the face in the seal cavity.

The flexible bellows and holding rig are molded of special high-grade synthetic-rubber stocks for maximum resistance to oil, hydrocarbons, refrigerants, water and antifreeze solutions. The other parts are made of materials best suited to give maximum service and to resist the chemical action of the fluids handled.

This seal is manufactured by Crane Packing Co., 1819 Cuyler Avenue, Chicago 13, Ill. An illustrated bulletin giving full details is available on request.

Moore .. FOR SPECIALIZED FABRICATION

The Engineering Department and Shops of Lee C. Moore & Company, Inc., have been engaged for years in the design and manufacture of special structures and machines.

Plate work such as that illustrated in this Marine Derrick Foundation is a typical example of our specialized fabrication for the petroleum and other industries.

Photo Courtesy Standard Oil (N. J.)

LEE C. MOORE & COMPANY

INCORPORATED

PITTSBURGH ● TULSA

EXPORT OFFICE • 30 ROCKEFELLER PLAZA, NEW YORK

PRACTICAL REFINERY ENGINEERING

No. 17—Factors in Design and Operation of Heat Exchangers

by Paul Buthod and R. W. Whiteley

THE design of any heat-exchange system is governed by considerations of maximum efficiency and maximum economy. Many factors which are desirable from a theoretical standpoint must be balanced against manufacturing, investment, and operating costs.

Some of these factors are obvious while others must be carefully analyzed if efficient plant performance is to be attained. Heat-exchange systems can be designed in many different ways, as evidenced by the wide variety of installations in actual operation.

In most instances, the heat-exchange system is designed by the manufacturer who submits proposals and bids covering the installation. Due to the quality of engineering and a highly competitve market, the plant operator is assured of efficient heat-exchanger design. However, the manufacturer by himself is not in a position to make many decisions which from an economic standpoint are of far greater significance than the actual design of the heat exchanger, itself.

The economy of a heat-exchange system is dependent upon a number of factors including investment, depreciation, and operating costs. These cannot be entirely divorced from other plant operations. For instance, the heat exchange system of a topping plant, from a broad standpoint, results in lower investment costs for the pipe still. In general, it also decreases pipe-still operating costs. However, from a thermal standpoint, the efficiency of the pipe still is lowered due to the fact that the charging stock enters the still at a higher temperature and the flue gases leave at a higher temperature.

Thus any value placed on waste heat is not infallible and in part is dependent upon past records and sound operating judgment.

In many other operations, the economy of heat exchange is greatly affected by operating costs. Dirty stocks and frequent cleaning operations may greatly decrease the benefits accruing from a heat-exchange system. Fouling resistances are usually estimated by the manufacturer who furnishes the rating. In some instances, operating costs may be appreciably lowered by providing

This installment completes the series, which began in the issue of June 10, 1944. Installments have appeared in each issue since, excepting July 8 and September 30. Combined, the installments cover all important aspects of heat-transfer calculations.

more heat-exchange surface and thus increasing the time between cleanouts. Since plant records are not always available to the manufacturer, some operators prefer to specify the fouling resistance to be used in the heat-exchanger rating.

If failure of a heat exchanger results in a costly shutdown, standby units may be advantageous, even if appreciable increased investment is necessary.

Other than these broad policies and decisions which to a large extent must be made by plant engineers and management, other factors affect the efficiency and performance of the heat-exchange equipment, itself.

In any heat exchanger, the flow of heat is retarded by several individual resistances. One of these may be comparatively large and thus becomes the controlling resistance. For example, in an oil-to-water exchanger, the major resistance is usually on the oil side, neglecting any fouling conditions. Thus the heat-transfer rate cannot be increased to any appreciable extent by increasing the water velocity. It can be increased, however, by varying the factors which control the oil-side resistance.

Due to intricacies of design and a wide range of operating conditions, the most efficient design is usually accomplished by calculating all of the various combinations which can be used and determining which one of these will give the best heat-transfer rate.

The method of routing the fluids through the heat exchanger may greatly affect the heat-transfer rate. The following observations while useful are of a general nature:

1. The more viscous material is routed through the shell where greater turbulence can be accomplished by the use of baffles.

2. The smaller volume of fluid is routed through the shell where increased transfer rates can be attained by the use of close baffle spacing.

3. If one fluid is under appreciable pressure, it is routed through the tubes, since high-pressure shells are relatively expensive.

4. If appreciable scaling may occur, the fluid is routed through the tubes in order to facilitate cleaning operations.

Choice of the material to be routed through the tube side and its effect on the heat-transfer rate is illustrated in the following example.

Example 1.—A 40° A.P.I. Mid-Continent crude-oil charge to a tube still is to be treated in an exchanger by means of a 22° A.P.I. reduced crude. The crude oil is charged at the rate of 96,000 lb. per hour and will enter the exchanger at 310° F. and will leave at 416° F. The reduced crude flows at the rate of 38,500 lb. per hour and is to be cooled from 620° F. to 340° F. The average viscosity of the crude oil is 0.4 centipoises and the average viscosity of the reduced crude is 2.3 centipoises.

The exchangers to be used have the following dimensions:

I.D. of shell, 10 in.

Number of tubes, 76 (⅝-in., 16-gage.)

Baffle spacing, 4 in.

Length of tubes, 10 ft.

From the foregoing data, the heat-transfer coefficients are as follows:

Crude oil through the tube side—

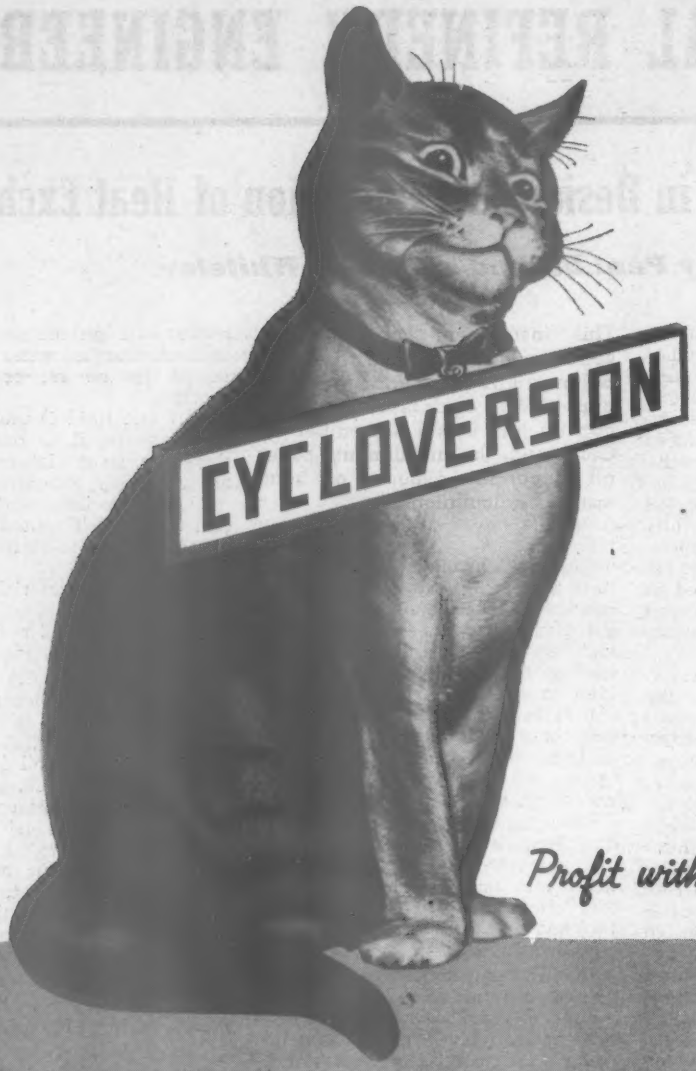
$$U = 59 \text{ B.t.u./hr.-sq. ft.-°F.}$$

Crude oil through the shell side—

$$U = 35 \text{ B.t.u./hr.-sq. ft.-°F.}$$

Thus from the standpoint of heat transfer, it is advantageous to route the crude oil through the tube side.

If the reduced crude is routed through the shell, however, the resultant pressure loss will require a pump and this factor should also be taken into consideration. Even in instances where excessive pressure does not effect the operation of other equipment, the necessary power required for pumping may represent an appreciable operating expense.



Profit with Perco Processes

Your present thermal cracking units can be economically converted to CYCLOVERSION catalytic cracking units by the addition of simple catalyst chambers and inexpensive catalyst reactivating equipment

PROCESSES ★ ENGINEERING
PERCO
RESEARCH ★ CONSTRUCTION

A *Division* OF
PHILLIPS PETROLEUM COMPANY, *Bartlesville, Oklahoma*

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Tank Foundations and Auxiliaries

AMONG the fixtures or auxiliary equipment used on storage tanks are:

1. Heating coils are used for viscous oils. In large tanks they are usually connected as three parallel coils, all three being used for most rapid heating and the smallest of the coils for maintaining the heated tank at temperature. (Refer to The Refiner's Notebook No. 12 in the September 23 issue.)

2. Smothering connections for foam systems or steam. Several openings on a ring are used on larger tanks. (Refer to Fire Underwriters regulations.)

3. Water sprays or water held on the top of the tank assists greatly in reducing evaporation losses but they are seldom used.

4. Swing lines for taking oil from near its surface in the tank are used on dirty products but are seldom used on finished products or rundown (process) tanks. Fig. 1 indicates such a feature as well as one type of liquid seal for the cable so that vapor losses are decreased. The drum for the cable may also be installed inside the tank to avoid vapor loss.

5. Ladders or stairways and also inside ladders.

6. Gaging hatch and sometimes manhole near bottom for cleaning.

7. Sampling cocks at several levels for pressure tanks.

8. Temperature lock or thermocouples for pressure tanks.

9. Vents, usually a screened opening turned down.

10. Pressure and vacuum regulator for holding 1 oz. (or less) pressure or vacuum. This lowers evaporation loss but necessitates a tight tank.

11. Painting with white paint reduces the evaporation as much as half in extreme cases and can be applied (two coats) at a cost of 8 to 30 cents per barrel of storage capacity, the larger figure for small tanks and the smaller for 1,000-bbl. tanks. The roof receives most of the sun's radiation and can be repainted at low cost.

Foundations

Tank bottoms suffer corrosion both from the inside and the outside. High ground is helpful and the site is leveled or sloped slightly to the center to avoid entrapment of water. Cinders, vegetation, manure, or dump materials are corrosive. Soil loads are so low that fills of 6 to 12 in. can be permitted but they should be avoided so far as possible. On tight clay soils which will hold water within the firewall dike, a mat or foundation thickness of 18 to 24 in. may be necessary but 12 in. suffices for most locations. An area 8-10 ft. larger in diameter than the tank is covered with 1-in. crushed rock or gravel containing some smaller-size stone. The 12-in. mat (or more) is tamped down with a slope from the center of about 2 in. for each 10 ft. of diameter. A 2-in. layer of oil-soaked (weathered crude oil, fuel oil or road oil) sand is sprayed over the mat and tamped lightly. The bottom is laid directly on the sand without tar paper but moisture should be wiped from the bottom plates. If flood-water or ground-water level requires a mat thickness of 6 ft. or more it is necessary to build wood or concrete piles at a cost ranging from 30 to 70 per cent of the regular tank cost.

TENTATIVE SCHEDULE OF TOPICS

Topics recently discussed and to be treated in early issues are:

No. 10—Tank Strapping Tables.

No. 11—Paraffin-Base Crude Oils.

No. 12—Heating Coils for Tanks.

No. 13—Naphthene-Base Crude Oils.

No. 14—Tank Foundations and Auxiliaries.

No. 15—Aromatic-Base Crude Oils.

No. 16—Corrosion Protection of Tanks.

No. 17—High Sulfur Crudes.

No. 18—Vent Lines—Vapor Handling.

No. 19—Topping Plant Flow.

This schedule completes the discussion of crude-oil storage but a few additional topics on products storage will be published during the next year. The topics on crude oil are also nearly complete and the first discussion of topping plant flow will appear soon.

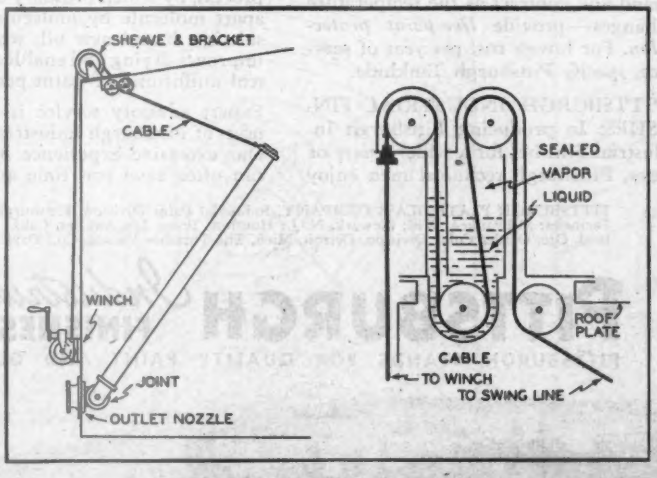
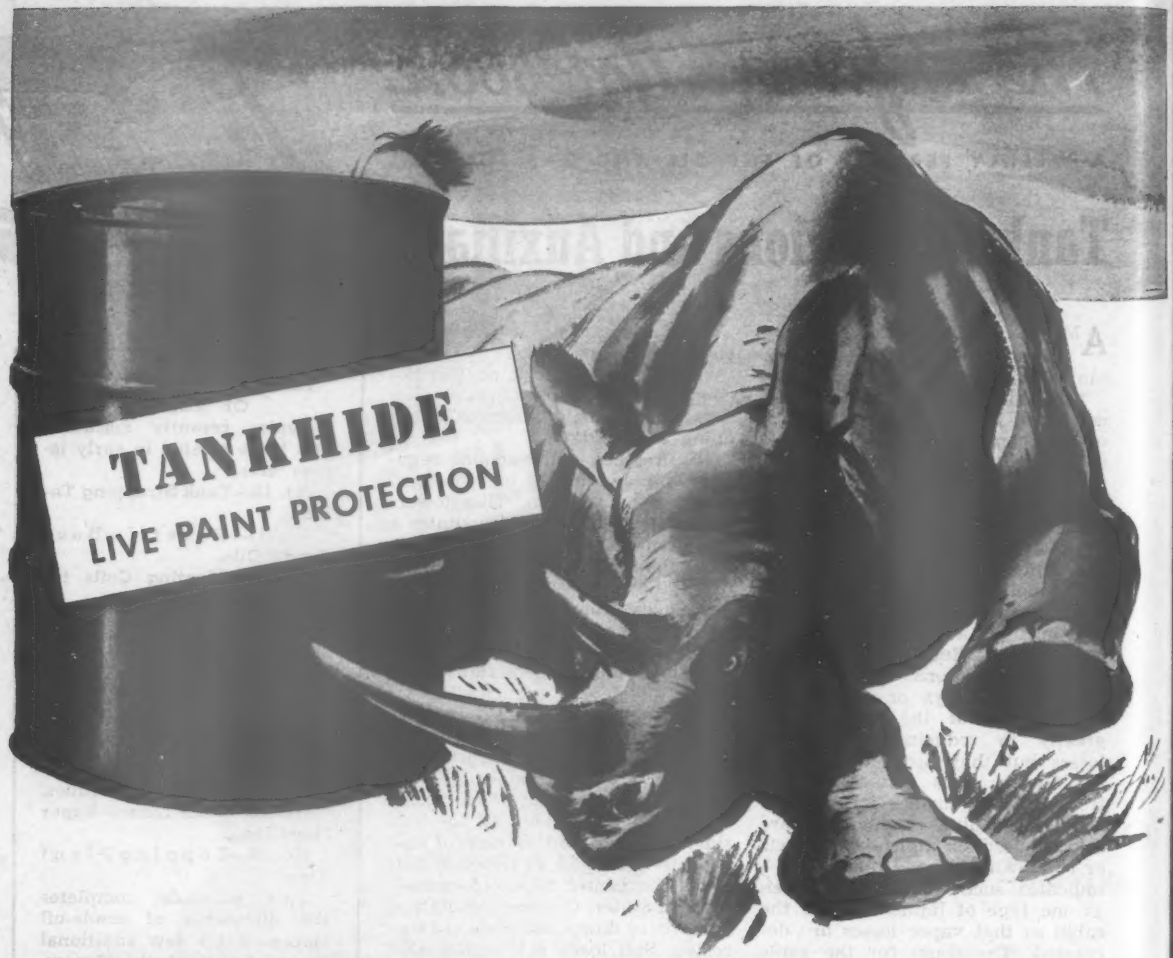


Fig. 1: Swing line and vapor seal

No. 14 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



TANKHIDE is tough!

LIKE the proverbial rhino's skin, Pittsburgh Tankhide has a remarkable ability to *"take it."* This protective finish interposes a tough, long-lasting "hide" between your oil and gasoline storage tanks and the weather. You will find Tankhide highly resistant to corrosion and the elements—quick-drying, easy-to-apply and remarkably economical.

Another advantage—Tankhide resists extremes of heat and cold because it is enriched with *"Vitolized Oils."* These improved oils keep the paint film *live*, tough and elastic—enable it to expand and contract as the temperature changes—provide *live-paint protection.* For lowest cost per year of service, specify Pittsburgh Tankhide.

PITTSBURGH INDUSTRIAL FINISHES: In producing Pittsburgh Industrial Finishes for a wide variety of uses, Pittsburgh technical men enjoy one great advantage—Pittsburgh has developed the molecular-selection process, by which ordinary oil is taken apart molecule by molecule. The result is a brand new oil, which vastly improves drying and enables us to control uniformity of paint performance.

Expert advisory service is offered to users of Pittsburgh Industrial Finishes. Our extensive experience in the field can often save you time and money.

PITTSBURGH PLATE GLASS COMPANY, Industrial Paint Division, Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Varnish Co., Dayton, O.

PITTSBURGH *Industrial* **FINISHES**

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS

MIGRATION OF OIL AND ORIGIN OF OIL POOLS

CRUDE oil occurs throughout the world in pools or subsurface concentrations where hydrocarbons have accumulated in some sort of structural trap. The structural traps in most places are spots within the earth where salt-water-bearing strata have been disturbed, faulted, folded, or pinched out to form a spot where the sand is relatively higher than most of the surrounding area and where the hydrostatic pressure in the sand is relatively lower, Fig. 1(B). Most structural traps which contain large pools of oil are situated in geosynclinal or broad geobasin areas where continuous sand sheets or continuous layers of porous limestone exist and extend throughout the geosyncline, Fig. 2.

A most interesting and long debated problem is: What caused the tiny hydrocarbon bubbles to migrate through the sand and accumulate in these local traps? The anticlinal theory of T. Sterry Hunt and others holds that accumulation is due to differences in gravity between water and oil and gas. Oil being lighter rises through sand and comes to rest at the top of anticlines. This theory was long ago disproven. Experiments and careful measurements show conclusively that the resistance to movement of fluid in capillary spaces such as occur between oil-sand grains is much greater than the force due to difference in gravity. Hence some other propelling force must be called upon to explain the movement.

Mills and Thiel considered that moving gas bubbles were the principal transporting agents, carrying the hydrocarbon particles upward from synclinal regions to the top of the anticlinal traps. Mills pointed out that faults are associated with structural traps. He placed oil, gas, and salt water in sand in a glass pressure box. A crack was produced by the pressure in the glass in the top of the box. Gas moved to the crack, escaped partly through the crack, and oil accumulated inside the box along the trend of the fracture. He considered that the accumulation of oil along faults was due to the propelling force of moving gas bubbles motivated by differential pressure. The pressure along an open fault is known to be lower than that in the interior of a layer of sand.

In recent years, however, petroleum engineers have carried on much research on the flow of fluids through sands, on the pressures within the earth, and on the performance of oil reservoirs. Some of these data have an important bearing on oil accumulation. Radial flow of homogeneous fluids or gases through porous sands toward a low pressure opening may be expressed by the following formula:

$$Q = \frac{2\pi \cdot t \cdot K(\Delta P)}{\mu \cdot \log_e rd/rw}$$

Flow of a homogeneous fluid through a sand will take place where the product of the thickness, t, permeability, K, and differential pressure, ΔP, multiplied by 2π is greater than the product of the viscosity, μ, times the $\log_e$ of the ratio of the radius of the

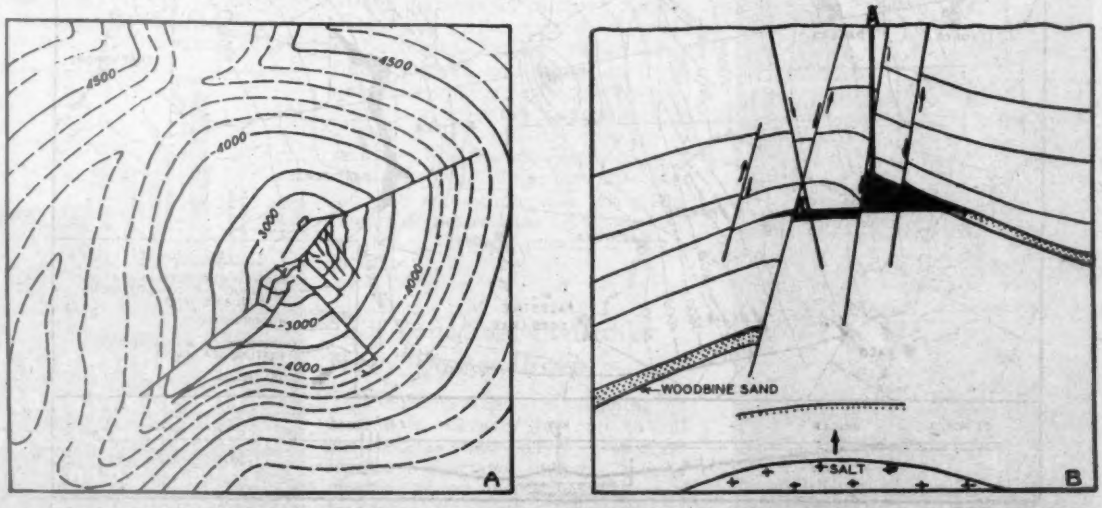


Fig. 1: Van oil field. A. Contour map showing structure of the Woodbine sand and numerous faults (from Liddle). B. Cross-section through the field showing the position of the oil pool in the sand

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

drainage area, rd, divided by the radius of the opening, rw. If one takes the Van pool of East Texas as a typical example (Fig. 1) and considers that the upthrust of the salt plug and resulting settling, cracking, and deforming of the strata around the plug opened up cracks and fissures over an area ¼ mile in diameter, allowed fluids and gas to escape, and built up a differential pressure between the top of the structure and base of the geosyncline 5 miles away to about 10 atm., then flow of gas to the top of the dome and into the faults would take place where the thickness of the gas layer is 1 cc., the permeability of the sand 1 darcy, and the viscosity of the gas 1×10 centipoises at the following rate:

$$Q = \frac{2 \cdot 1 \cdot 1 \cdot 10}{1 \times 10^{-4} \log_e (5/5)}$$

$$= 31{,}416 \text{ cm. per second}$$

Long-distance migration appears to be possible as long as nonstatic conditions prevail, that is, as long as the faults are open, and the volume of pore space on top of the dome is increasing. However, the fluid in oil sands is not homogeneous. It consists not of water or oil alone, but of a mixture of water, oil and gas. Therefore, the effect of water on long-distance flow of oil or gas bubbles needs to be considered. The interfacial tension between water and silica is known to be high. Once a sand is wet, a film of water forms over the surface of the sand which requires considerable force to displace. When hydrocarbons move through a sand wet with water, it is considered that they displace the water in the capillary spaces but not the film clinging to the silica surface. Hence in the migrating of hydrocarbons through water-wet sand, the principal forces to be overcome are the gravity of the water above and the interfacial tension between water and oil in the capillary spaces. The gravity effect, of course, is known, and the interfacial tension can be measured with a Bartell tube or by other methods. Attempts have been made also to calculate it. According to Garrison, the following equation may be applied to calculate the interfacial tension, I:

$$I = \frac{2 \cos \Theta}{r \, (dw - do) \, g}$$

The contact angle between oil and water, Θ; the density of water, dw; and that of oil, do; and the gravity factor, g, would be constant in a given sand; therefore, the variant factor on which the interfacial tension depends must be the radius at the pore spaces, r, of the sand. These vary greatly and are difficult to measure accurately. Probably the hydrocarbons migrating through sand travel through the largest open pores adjacent to the source bed. Such pores vary in size from 0.007 to 0.02 mm. No accurate method to arrive at an exact average diameter is known and therefore the interfacial tension cannot be calculated accurately. Fortunately, however, one can measure the permeability of dry sands to hydrocarbons, KO, and then wet the sand with various quantities of water and measure the wet permeability, KW. The ratio of these permeability values, KO/KW, may then be regarded as a measure of the interference of water to hydrocarbon flow. The measurements have been made in a radial constructed permeability apparatus and show that where there is more than 85 per cent of water in a sand, no oil droplets flow through the pores. If there is about 70 per cent of oil in the sand and 30 per cent or less of water, the permeability of Woodbine sand to the flow of oil is reduced by about 50 per cent and for West Texas oolitic limestone about 62 per cent.

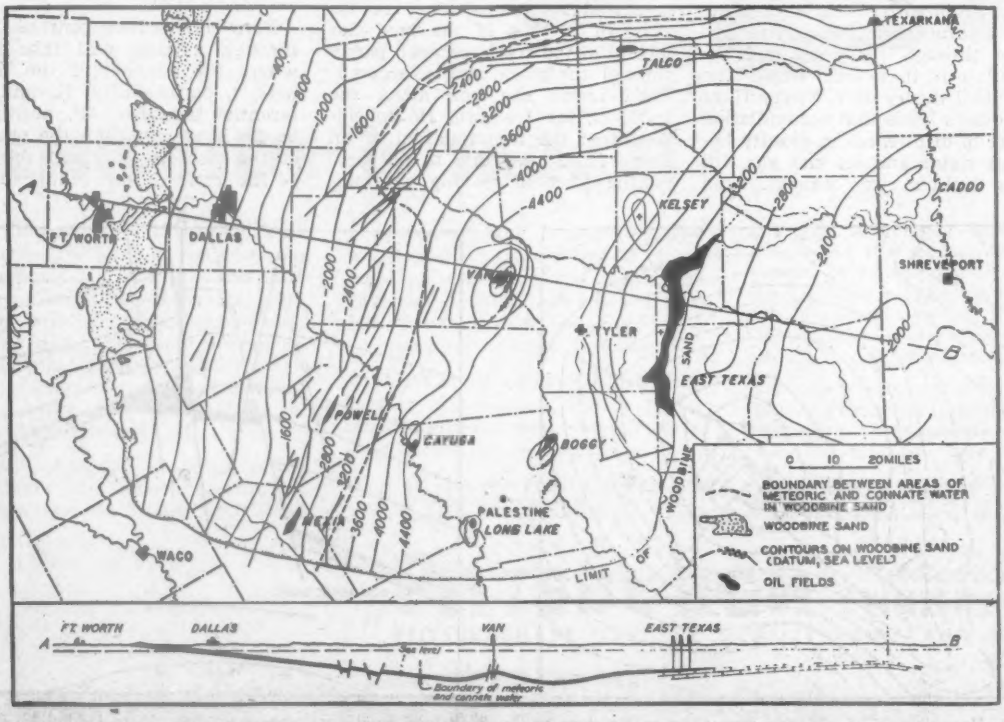


Fig. 2: Map of northeastern Texas showing outcrop of the Woodbine sand, structural contours on top of the sand, and oil fields producing from the Woodbine. The sand sheet is in the form of a broad trough tilted southward, its deepest portion being near Palestine. The oil pools lie in the lower portion of the trough and produce from the lower quarter of the Woodbine sand sheet and in the salt-water area. (Adaptation from Plummer and Sargent)

REFINING

Gulf Coast Gasoline Stocks Record Mild Upturn

HOUSTON. — Gasoline stocks at the 11 active plants of Gulf Coast Refiners Association totaled 1,407,091 bbl. at the close of September, a rise of 28,773 bbl. over the inventories reported September 15 and comparing with 1,665,565 bbl. a year ago. Two years ago the stocks of these refineries totaled 2,531,453 bbl.

Automotive gasoline stocks considered alone were 477,221 bbl. on October 1, an increase since September 15 of 90,392 bbl., reflecting a little improvement over the previous report when the lowest stock position in 5 years was indicated by the association. This total represents about 63 per cent of the 756,873 bbl. of automotive gasoline in storage a year ago, but only 29 per cent of the 1,615,160 bbl. reported on October 1, 1942, when such a volume was considered about normal.

Kerosene stocks at 212,085 bbl. October 1, indicate 18,164 bbl. decrease during the 2 weeks. Diesel gas-oil stocks were 106,073 bbl., an increase of 23,536. Stocks of other grades of gas oil decreased 10,683 bbl. to 1,012,979 October 1. These stocks last year were about the same, but 2 years ago the group carried 1,376,551 bbl. of burning oils and 828,656 bbl. of diesel gas oil, or practically double the present inventory.

No. 5 fuel oil increased 125,871 bbl. to 383,953, and Bunker C fuel oil decreased 87,635 bbl. to 408,889 on October 1.

Total stocks of all products in the plants of the group were reported at 3,662,143 bbl. October 1, an increase of 57,153 during the second half of September. A year ago total products stocks were 3,520,927 bbl. Two years ago they totaled 5,811,230 bbl. which was considered about normal.

Crude-oil throughput was 117,542 bbl. a day maintaining recent high levels. Crude runs, at 84 per cent of rated capacity, represent an increase of 27,062 bbl. daily in comparison with operations at 75 per cent of capacity a year ago when the group processed 90,482 bbl. a day. Two years ago crude runs were 102,666 bbl. daily.

Fewer Refiners Required To Share Their Crude

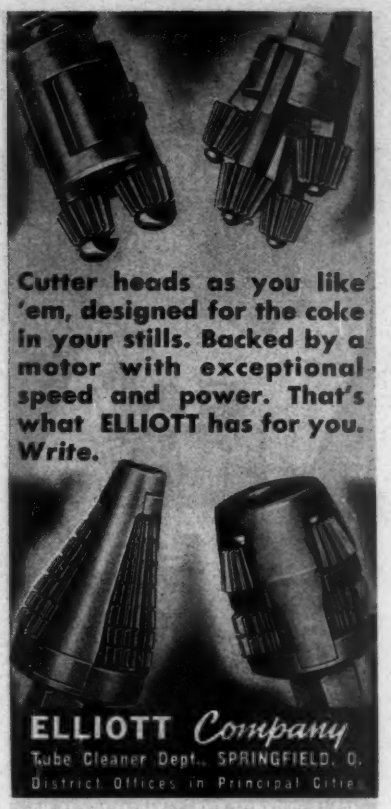
CHICAGO. — Twelve refiners in District 2 (Middle West) will participate this month in the Petroleum Administration for War crude sharing program, releasing supplies to 17 other refiners in the district, under the crude-allocation plan. A total of 19,525 bbl. will be shared thus daily. This is a reduction of two in the number of supplying companies and in the quantity of crude to be shared. In September, 14 refiners shipped an average of 21,795 bbl. daily to 16 other refiners whose crude supplies were inadequate.

This is the smallest number of suppliers and the smallest volume of crude involved since the plan was put into operation last year. The figures do not include oil which may be shared through private arrangement.

"Fill Your Fuel-Oil Tanks Now," Davies Urges

WASHINGTON. — A warning to household users of fuel oil to fill their tanks now as a protection against shortage when winter weather comes was issued last week by Ralph K. Davies, deputy petroleum administrator for war. Explaining that storage space for civilian grades of fuel has been reduced sharply by reserves of oil products

We design and construct all types of modern refining units.
Serving the Industry Since 1918
BORN ENGINEERING CO.
Tulsa, Oklahoma


Cutter heads as you like 'em, designed for the coke in your stills. Backed by a motor with exceptional speed and power. That's what ELLIOTT has for you. Write.
ELLIOTT Company
Tube Cleaner Dept., SPRINGFIELD, O.
District Offices in Principal Cities

LEADING CONTRACTORS PREFER
Sterling
PUMPS • HOISTS • LIGHT PLANTS
DEPENDABLE
RUGGED
SIMPLE
•
SAVE
MONEY
SAVE
TIME
EASY
TO
OPERATE
•
WRITE
FOR
CATALOG
STERLING QUALITY
STERLING
MACHINERY CORPORATION
405-13 SOUTHWEST BLVD. KANSAS CITY 10, MO.

Thermowells
Specially Designed for the OIL and CHEMICAL INDUSTRIES
Write us your requirements.
Folder of standard types sent on request.
TRINITY
TRINITY
EQUIPMENT & SUPPLY CO.
136 LIBERTY ST. NEW YORK 6, N. Y.

Sketches of Plant Operators

FRANCIS H. SMITH, who was appointed assistant general manager of Standard Oil Co. of California's manufacturing department on September 1, 1944, started work with the company in 1913 at the El Segundo refinery and recently completed 31 years of continuous service. Before joining Standard of California, Smith had been a laboratory inspector for the Great Western Sugar Refining Co. at Greeley, Colo.

At El Segundo refinery, Smith worked in a variety of capacities, including laboratory inspector, research operator, foreman of the lubricating oil treating plant, and assistant superintendent. In 1928 he was transferred to the Richmond refinery as superintendent and 6 years later he was appointed manager at that plant. In this position, he was in direct charge of the war expansion program at the Richmond refinery, which is one of the West Coast's largest 100-octane gasoline producers.

Smith was born at Conneautville, Pa., is married and has a son, James, in the Navy. During his 10-year residence at Richmond, he had taken an important part in the city's civic affairs. His present office is at the headquarters of the company in San Francisco and he has been succeeded as manager of the Richmond refinery by R. K. Rowell.

FRANCIS H. SMITH

built up for Army and Navy use, Davies said:

"Fuel oil dealers, working as they are under wartime conditions, need the assistance of every user of fuel oil, if the nation's tanks are to be filled before winter arrives. Military and naval demands make it imperative that large reserves be maintained in this country."

Pennzoil Planning to Build Unit Costing $1,400,000

OIL CITY, Pa. — Construction of an addition to its No. 1 plant at Rouseville, to cost $1,400,000, is planned by The Pennzoil Co., W. S. Zehrung, president, announced. The unit, authorization for which has been received from War Production Board, will be a methyl-ethyl-ketone plant for removal of wax from oil and for recrystallization of wax. Contract for the job has not been awarded.

New Refining Directors Appointed by PAW

WASHINGTON. — Carleton J. Everett has been named director of refining in the Atlantic Coast area and Edward A. Markey has been appointed to a similar post in the Rocky Mountain district, by Petroleum Administration for War. Everett formerly was with Standard Oil Co. of New Jersey, and Markey was with Continental Oil Co.

OIL and GAS
BURNING EQUIPMENT
NATIONAL
AIROIL
BURNERS
1236 E. Sedgley Ave.
PHILADELPHIA 34, PENNA.

McNAMAR
Steel Plate
Fabricators and
Contractors
•
Products storage
•
Pressure vessels
McNAMAR
BOILER & TANK CO.
Tulsa, Okla. — Salem, Ill.

Ten Leading Benefits of ALLIED STEEL BUILDINGS

1. Low initial investment
2. Low cost maintenance
3. Long life
4. Fire resistant
5. Portability
6. Easy to construct
7. Easy to dismantle
8. Practically 100% salvage
9. Flexibility in lengthening or shortening
10. Weathertight

ALLIED PRODUCTS STEEL

Write for our complete catalog.

Use our Engineering Service "From Analysis to Finished Building."

ALLIED STEEL PRODUCTS CORP.

1407 No. Peoria Tulsa, Okla.

We've learned a lot

—since 1920!

The supply business these days is made up of a group of industrial giants. The smaller units, therefore, must keep on their toes to stay in the "swim."

Our position in the industry has been gained by a spirit of aggressive management, sound policy, and, above all, an inherent desire to serve our customers well.

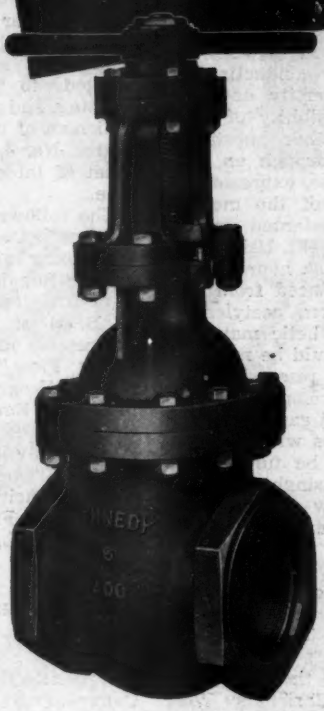
LUCEY

LUCEY PRODUCTS CORPORATION

OIL WELL SUPPLIES

TULSA, OKLAHOMA

OUTSTANDING VALVE SERVICE



Screwed End, Outside Screw and Yoke, Iron Body Bronze Mounted Gate Valve for 400 lb. oil or gas pressure; one of the many Kennedy types designed specifically for the oil and gas industry.

Discs that seat tight, operating mechanisms that open and close the valve easily, stuffing boxes that are amply deep and conveniently repacked, bodies with an ample margin of strength, precision machine work throughout . . . all these factors that provide OUTSTANDING VALVE SERVICE are found in every KENNEDY Valve. Write for Catalog 63 describing these Kennedy Valve characteristics in detail.

THE KENNEDY VALVE MFG. CO. ELMIRA, N. Y.

KENNEDY

VALVES-PIPEFITTINGS-FIREHYDRANTS

Natural Gas

Sees Natural Gas as Raw Material for Chemistry

AUSTIN.—Dr. E. P. Schoch, who for years has been conducting research at the University of Texas looking to the possibility of making plastics and other substances from natural gas through an electric-discharge process, expresses the belief that success of the method, which has been patented in the state's name, is in sight. Using electric power at off-peak hours, acetylene would be produced from natural gas. Then from acetylene a wide range of synthetic materials, including rubber, could be made.

Dr. Schoch hopes research at the university will develop a method by which casinghead gas, now wasted in vast quantities with the production of oil, can be turned into useful channels. Casinghead gas is produced under low pressure and in many fields is burned to get rid of it.

Dr. Schoch believes natural gas will ultimately become too valuable for use as industrial fuel, because of its potentialities in the field of chemistry. He expressed no opinion concerning the new pipe line from Corpus Christi to West Virginia which soon will begin carrying 200,000,000 cu. ft. of gas daily.

The larger problem, he said, is to eliminate the waste at home and help the industry use the gas for the greatest benefit to the largest number of people.

"I see great possibilities for creating, through private enterprise, a wide field of postwar employment in the natural-gas chemical industries," said Dr. Schoch.

Gas-Measurement Course May Be Resumed in 1945

MORGANTOWN, W. Va.—Tentative plans for resumption in 1945 of the Appalachian gas-measurement short course were laid at the 2-day meeting of the general committee held here at the School of Mines, West Virginia University. The course, normally conducted annually by the School of Mines, in cooperation with Public Service Commission of West Virginia, West Virginia Oil and Natural Gas Association, American Gas Association and industries concerned, has been suspended, beginning with 1942, owing to war conditions.

S. R. Beitler was named chairman of a special committee appointed to investigate regulator freezing, and C. A. Smith was made chairman of practical methods committee No. 4, which is to prepare a set of tables and graphs for gas men.

The following papers and reports were presented at technical sessions: "Designing and Installing Measuring and Regulating Stations," Report 3 of practical methods committee, C. B. Heist, chairman; "New Developments in Measurement of Pulsating Flow," S. R. Beitler; "Extension Program of the School of Mines for Employes of the Natural Gas Industry," George McKinley; "Gas Supply in West Virginia," H. J. Wagner; "Operation and Testing of Large-Capacity Displacement Meters in the Field," John L. Galpin and Walter L. Smith.

FPC Denies Application of Wisconsin Southern Gas

WASHINGTON.—Federal Power Commission has denied applications filed by Wisconsin Southern Gas Co. asking that Natural Gas Pipe Line Co. of America be directed to extend its transmission facilities to the Illinois-Wisconsin boundary near Genoa City, Wis., and to sell natural gas to Wisconsin Southern for distribution in southeastern Wisconsin; and Wisconsin Southern to construct and operate a 4½-in. pipe line from the Illinois-Wisconsin boundary to Wisconsin Southern's existing gas-distribution system at Lake Geneva, Wis.

Wisconsin Southern's object was to enable that company to substitute straight natural gas for manufactured gas now served to its customers in Racine and Walworth counties, Wisconsin, including Burlington, Lake Geneva, Williams Bay, Delavan and Elkhorn.

Problem of Natural Gas for Carbon Black Reappears

AUSTIN.—The problem of whether to permit use of sweet natural gas in the manufacture of carbon black has been placed in the lap of the State Railroad Commission again. War Production Board officials came here several months ago in an unsuccessful effort to persuade the commission to permit such use.

The Coltexo Corp. went before the commission last week asking permission to install meters at the plant of Smith Brothers Refinery Co., Inc., to measure both residue gas (legal for carbon black) and natural gas (prohibited for carbon black under Texas law.

J. W. Hassell, of Dallas, representing Coltexo, said Jack Baumel, commission examiner, plans to deliver to oil leases of The Texas Co. and Skelly Oil Co. a volume of gas equal to the intake of high-pressure gas which may be legally used for fuel and lease operations, on the ground that this procedure will allow the carbon-black plant to increase its output and supply many vitally needed materials.

Cycling

Willow Springs Plant to Be Moved to Carthage

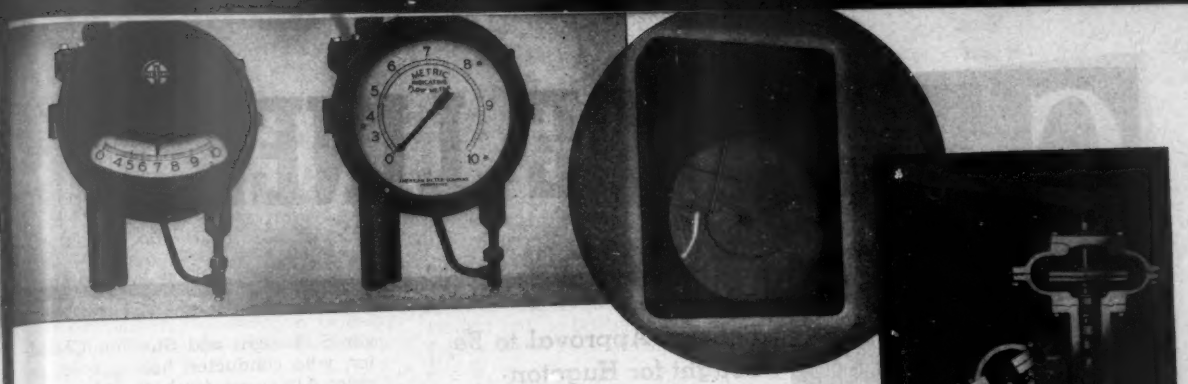
MARSHALL, Tex.—Lone Star Producing Co. has entered the Carthage field of Panola County through an agreement to take gas produced by Rogers Lacy, Longview operator and refiner, and Lacy in turn has announced plans for a cycling plant in the field. Lone Star said it would lay a pipe line from the field to its Trinidad plant. This project is estimated to involve expenditure of $2,500,000.

Lacy owns a cycling plant in the Willow Springs area of Gregg County, where Lone Star has extensive holdings, and this plant will be dismantled and moved to the Carthage field. The new location has not yet been selected, but work on both the plant and the carrier will begin soon.

Lacy has seven gas and distillate producers in the Carthage field and holds 30,000 acres of land considered in proven area. Five of the wells have a potential of 200,000,000 cu. ft. of gas each day. Lacy is now drilling two other tests.

The contract between Lone Star and Lacy on file at the county clerk's office in Carthage provide that Lacy shall sell the gas to Lone Star for 5⅛ cents per 1,000 cu. ft. Lacy already has received a check for $800,000 as part of the initial payment.

The Carthage reserve has been called second only to the Panhandle field in Texas.



BRANDS *oil men look for*

RELIANCE-AMERICA

B-1383

CRC
PIPE LINE CONSTRUCTION EQUIPMENT
CRUTCHER-ROLFS-CUMMINGS
Pipe Line Equipment and Materials
Houston, Texas, U. S. A.

Reilly
PIPE ENAMEL
FOR
DEPENDABLE PROTECTION
On Oil, Gas, Gasoline and Water Lines
Reilly COAL TAR PRODUCTS
17 PLANTS To Serve THE NATION
REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg., Indianapolis
500 Fifth Ave., New York • 2513 S. Damen Ave., Chicago

PIPE LINES

Federal Approval to Be Sought for Hugoton-California Line

Government approval for a $60,000,000 natural-gas line for transmission from the Hugoton gas field of Kansas, Oklahoma and Texas to California will be sought, according to reports. In discussions of the project it has been mentioned that plans for construction have been made by Southern California Gas Co. and by Southern Counties Gas Co., both subsidiaries of Pacific Lighting Corp., as well as by Pacific Gas & Electric Co. It has been reported that a 27-in. line is being considered for operation at high pressures, possibly up to 1,200 lb.

Gas Line Planned to Monterrey, Mexico

Plans are being made by Gas Industrial de Monterrey, S. A., for a 140-mile 14-in. natural gas transmission line to be constructed from Rey Nosa, near the United States boundary, to Monterrey, Mexico. The project is said to be financed by Mexican capital to increase fuel supply beyond what is possible by the present facilities transmitting gas from Texas to Monterrey.

Glenn McCarthy to Build Gas Line to Port Neches

Glenn McCarthy interests will start construction in the middle of November for the laying of a 24.7-mile 10¾-in. natural-gas line from Winnie to Port Neches, Tex. In connection with the undertaking a natural-gasoline plant will be built by Stone & Webster, Inc.

Court Enjoins ICC In Champlin Case

Enforcement of an Interstate Commerce Commission valuation order issued to the Champlin Refining Co., Enid, was ordered enjoined pending settlement of a suit filed by the company asking a suspension of the ICC order.

The decision was made by the three judges, Circuit Judge Alfred P. Murrah and District Judges Edgar S. Vaught and Stephen Chandler, who conducted hearings on the case. Attorneys for both sides were given 30 days to file briefs.

The Champlin company argued that the ruling that it is a common carrier and subject to the ICC Act is arbitrary and in excess of the commission's power. Harry Glasser, company attorney, contended that the company's pipe line is used to transport its products from Enid to Kansas, Nebraska and Iowa, and is not a common carrier.

Representing ICC were Edward Dumbauld, special assistant to the attorney general, and Nelson Thomas, ICC attorney.

Tennessee Completion Delayed by Rains

Completion of the Tennessee Gas & Transmission Co. 1,265-mile line from Corpus Christi, Tex., to Cornwell, W. Va., has been delayed by rainy weather during the past week. Five spreads were working at the beginning of this week to complete 14½ miles of 24-in. in Kentucky and West Virginia. All but 88 miles of line has been pigged and blown; only eight gates remain to be set.

Stanolind Is Filling Elk Basin Pipe Line

Stanolind Pipe Line Co. is now in the process of filling the recently completed crude-oil pipe line from Elk Basin to Casper, Wyo. Most of the oil entering the line comes from the Elk Basin field; some oil is entering from the Gebo pool. Within several months it is expected that oil will be pumped into the line from the Oregon Basin pool. It is believed that as a result of the initial filling of the line, receipts will start arriving at Casper in December.

Utah Is Completing Craig-Wamsutter Line

Utah Oil Refining Co. is completing this week construction of a 110-mile 6-in. crude-oil line from the Iles Dome pool, near Craig, Colo., to the company's trunk line station at Wamsutter, Wyo. The line will be filled and put in operation shortly after it is finished.

Ohio Oil Co. Products Pipe Line Progresses

Thirty-three miles of line had been laid early this week for Ohio Oil Co.'s 115-mile 8-in. refined products pipe line from Robinson, Ill., to Indianapolis, Ind. Most of this had been laid at the west end. The project is scheduled for completion in November. Construction is being handled by Sheehan Pipe Line Construction Co.

WEP 20-in. Products Line Throughput Increases

The increased rate of throughput of the 20-in. products line of War Emergency Pipelines, Inc., from the Gulf Coast to Atlantic seaboard refineries is indicated by reports for the week of September 23-30 which show that an average of 192,873 bbl. daily was pumped from Beaumont, Tex., and 192,861 bbl. daily from Norris City, Ill. In this same period an average of 192,065 bbl. daily was delivered to purchasers in the New York City area. These rates show a distinct rise from the 185,000 bbl. daily throughput characteristic of most of the line's operation earlier this year.

The WEP 24-in. crude oil line from Longview, Tex., to the New York-Philadelphia area maintained its consistently high throughput during the same period when average daily pumpings were as follows: Longview, Tex., to Norris City, Ill., 324,596 bbl.; deliveries to Ohio Oil Co. lines from Norris City, 16,578 bbl.; deliveries from Norris City to the East Coast averaged 303,117 bbl. of which 136,912 bbl. went to refineries in the Philadelphia area and 163,603 bbl. to refineries in the New Jersey-New York area.

MOLE
Pipeline
Cleaner

For BETTER cleaning of
CRUDE LINES
PRODUCT LINES
NATURAL GAS LINES

FOR DETAILS WRITE

Pipeline Cleaners Co.
Fort Madison, Iowa

United Natural Laying Line In Pennsylvania

To enlarge facilities needed for transmitting natural gas from the Tennessee Gas & Transmission Co. system, United Natural Gas Co. is building a 37-mile, 12-in. line near Grove City, Pa. The general contractor, Anderson Brothers, has completed more than half the line in the 3 weeks during which the firm has been on the job. Pipe is welded by Pressure Weld Co. The terrain is reported as rough. Contractors' headquarters are at Grove City.

Colonial Beacon Line Delayed by Rezoning

Construction of Colonial Beacon Oil Co.'s 35-mile products line of 4-in. and 6-in. pipe has been delayed by a hearing held regarding rezoning affecting the location of the proposed delivery terminal at Methuen, Mass. Railroad and highway crossings have been installed at three locations in spite of the delay in starting on the main line along a route from Everett to Methuen, near Lawrence, Mass.

High-Pressure Helium Line Laid by Bureau of Mines

For transmitting helium at 2,500-lb. pressure, U. S. Bureau of Mines is laying a 32-mile, 2½-in. o.d. line for use in connection with the helium plant at Amarillo, Tex. The pipe is not of the unusual thickness previously reported. The general contractor is Connor & Fowler. Welding is done by Pressure Weld Co.

Laying of Carbon-Black Lines to Start Soon

BORGER, Tex.—Work is expected to start before November 1 on the laying of about 32 miles of 20-in. and 12-in. pipe line for movement of gas from the Borger-Pampa area of the Texas Panhandle to carbon-black plants of Phillips Petroleum Co. Eastern Construction Co. has the contract.

ADECO

NOZZLE TESTER

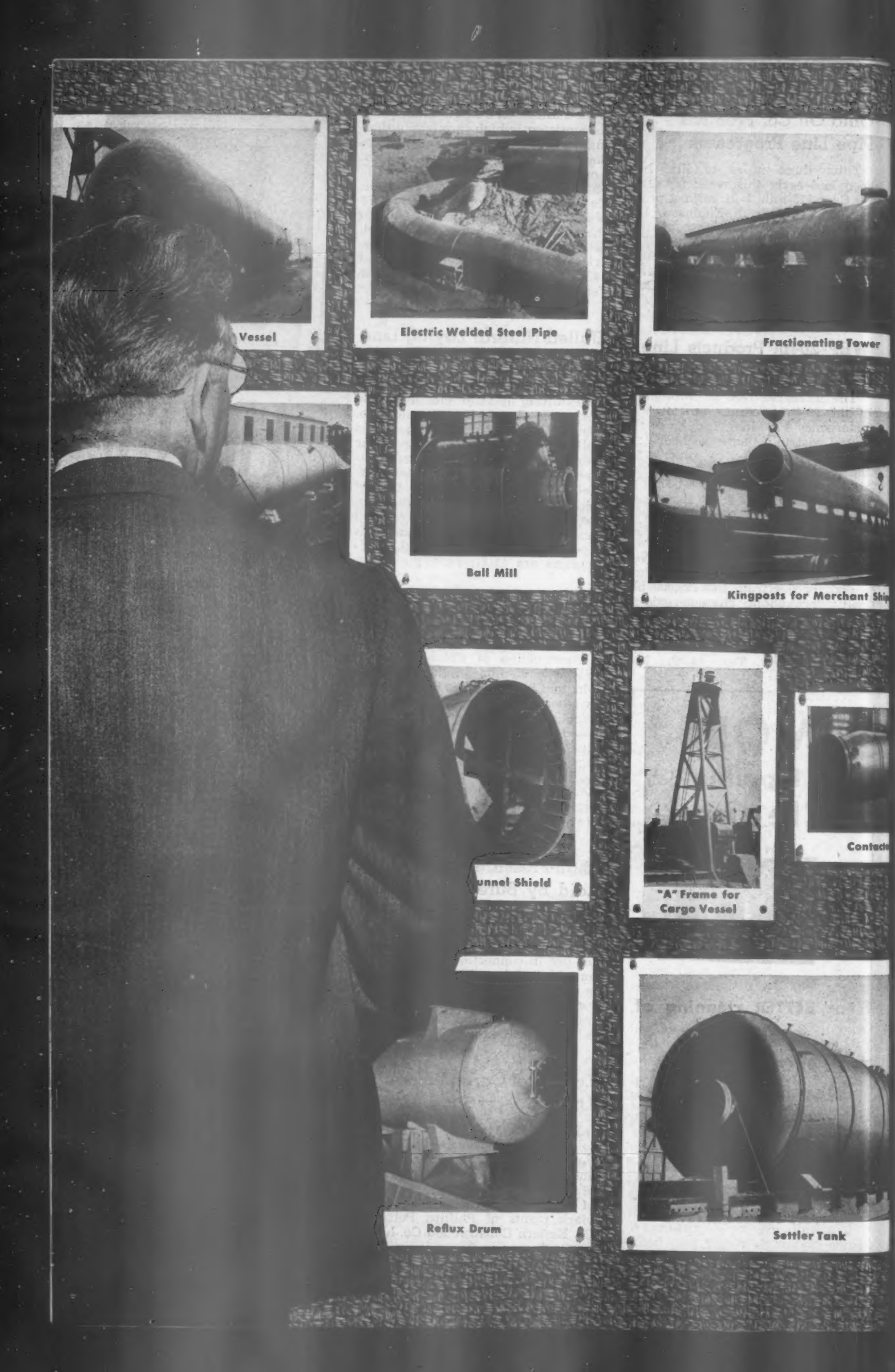
KEEP DIESEL ENGINES RUNNING AT PEAK EFFICIENCY

With this sturdy, portable, lightweight Adeco Nozzle Tester, any mechanic can easily make quick, accurate tests on injector opening pressure, spray pattern, etc. and detect stuck needle valves and leakage around valve seats. Adeco advantages have made this America's most widely used nozzle tester. Tests both large and small injectors, on bench or engine. Avoids costly delays and possible damage to engine. Keeps diesels operating at peak efficiency.

Write for new illustrated bulletin.

ADEC

AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 NORTH RAVENSWOOD AVENUE
CHICAGO 40, ILLINOIS


Vessel
Electric Welded Steel Pipe
Fractionating Tower
Ball Mill
Kingposts for Merchant Ship
unnel Shield
"A" Frame for Cargo Vessel
Contacto
Reflux Drum
Settler Tank

Exploration and Drilling

Week's Highlights

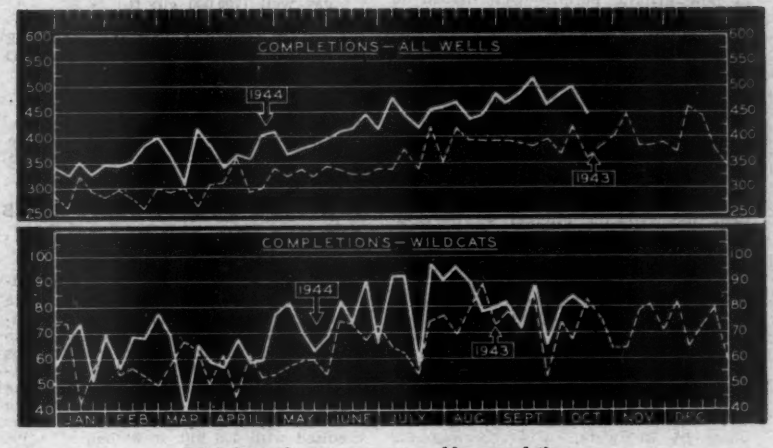
LOUISIANA has two wildcats this week which will bear watching. One has the earmarks of a possible major oil pool opener, while the other is a condensate discovery in an area where the previous available geological evidence, admittedly scant, indicated a deep syncline, with little or no possibilities of oil production.

By a coincidence, both were Barnsdall Oil Co. joint ventures. The first, a possible major oil pool opener, is Barnsdall et al 1 Minor Miller, in 38-7s-3w, Jeff Davis Parish, west of the Tepetate pool. This test, with a contract depth of 10,000 ft., was drilled to 10,034 ft., set 7-in. casing at 9,345 ft., and perforated at 8,510-26 ft., opposite a sand in the lower member of the Ortego series. On test the well flowed 33 bbl. per hour of 35° gravity oil through a 3/16-in. choke with a tubing pressure of 1,400 lb.

The 1 Minor Miller was the second test on this structure. The first wildcat, 1 Fuselier, drilled by the same interests about 1 mile east of the present discovery, blew out and was junked at 9,580 ft. Location for 2 Minor Miller, 933 ft. east of the discovery well, has been announced.

The condensate discovery is Barnsdall and Sohio Petroleum Co. 1 Hanks, SW NE 7-20n-12w, in Bossier Parish, about 14 miles west of the Cotton Valley field. This test found the Bodcaw sand of the Cotton Valley series at 8,114-48 ft., with no water, and perforated in two stages at 8,114-50 ft. to take in the whole sand section. On testing it flowed at the rate of 125 bbl. of condensate per day with an estimated 3,000,000 cu. ft. of gas.

The interesting thing about the Hanks well is that it lies about midway between the Bellevue and Pine Island pools, both producing from the shallow sands, and in both of which deep, dry tests have been drilled. The Bellevue deep test went to the salt in the Eagle Mills and the Pine Island test drilled to igneous rock at 11,418 ft. Correlation of the logs indicated a deep syncline between the two, but the Barnsdall discovery shows the syncline was not as deep as thought, at least not too deep to prevent the Cotton Valley from producing.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

Week ended October 14, 1944

	Oil	Gas	Dry	Total	Footage	Total Comp to date 1944	1943
N. Y., Penna., W. Va.*	56	15	7	78	118,661	2,717	2,708
Ohio	5	10	8	23	48,318	783	726
Indiana	5	0	3	8	17,038	200	175
Kentucky	8	2	5	15	30,259	583	338
Illinois	29	0	20	49	128,022	1,476	1,391
Michigan	6	2	11	19	51,051	519	480
Kansas	18	2	25	45	144,080	1,434	1,303
Nebraska, Missouri, Iowa	0	0	0	0	0	31	39
Oklahoma	25	0	14	39	165,804	1,411	934
Texas:							
North Central	11	0	10	21	64,559	1,147	1,153
West	19	0	7	26	103,268	1,223	690
Panhandle	5	1	0	6	18,659	207	142
Eastern	5	2	4	11	72,184	255	230
Gulf Coast	19	3	6	28	185,532	984	361
Southwest	2	0	2	4	14,798	540	722
Total Texas	61	6	29	96	458,998	4,356	3,298
Louisiana:							
Northern	3	2	3	8	41,217	250	249
Southern	5	1	3	9	86,859	375	283
Total Louisiana	8	3	6	17	128,076	625	532
Arkansas	2	0	2	4	24,275	172	200
Mississippi	1	0	0	1	4,824	111	72
Southeastern States	0	0	3	3	21,259	41	†
Montana	4	0	2	6	16,484	282	179
Wyoming	3	1	0	4	16,607	136	112
Colorado-Utah	0	0	0	0	0	29	21
New Mexico	5	0	1	6	16,753	306	181
California	29	3	1	33	118,963	1,565	1,050
Total United States	265	44	137	446	1,509,472	16,777	13,740
Total previous week	300	52	148	500			
Total Oct. 16, 1943	193	31	128	352			

*Does not include 53 service wells. †Included in total shown for Mississippi.

MICHIGAN

Exploration Continues at Rate Unequaled Since War

SAGINAW. — Michigan oil exploration, continuing at a pace unequaled since the beginning of the war, resulted in 19 more completions in the past week while 22 new drilling permits were issued to bring the permit total for the year to 562.

Checking on Michigan operations, F. R. Frye, state petroleum engineer, reported drilling is 15 per cent ahead of last year with more than 500 tests already completed this year, resulting in 180 oil producedes, 50 gas wells, the remainder dry holes.

"There is a greater feeling of optimism among oil men that at any time since the war began," Frye declared. He attributed the growing interest to developments in various new sections such as Coldwater Township in Isabella County, Arenac's Deep River pool, the Montcalm-Ionia counties Bloomer field, some successes in Allegan County and the occasional big wells of the Fork-Mecosta and Adams-Arenac pools.

Three big producers were among the six oil wells completed last week. One was a Deep River completion with a potential of 2,800 bbl., one a Bay County well which flowed 50 bbl. an hour, another in Coldwater which flowed 513 bbl. the first 22 hours.

Four of the 11 dry holes were wildcats. A fifth wildcat test brought some gas when it was plugged back to Berea after a search for oil in Logan Township, Ogemaw County, which extended below 4,500 ft.

Allegan County locations were picked for four of the week's 22 new drilling permits. Others went: three to Osceola; two each to Arenac, Bay, Montcalm and Van Buren; one each to Isabella, Muskegon, Ionia, Midland, Oceana, Mecosta and Ottawa.

MICHIGAN WILDCAT COMPLETIONS

Allegan County, Hopkins Township: Charles Cook-Del Fortney 1 Philip Marron, SW SW SE 31-3n-12w, dry in Traverse limestone, TD 1,635 ft.

Lapeer County, Marathon Township: Sinclair-Wyoming Oil Co. 1 George McIntyre, SW SW SW 28-9n-9e, dry in Dundee, TD 2,775 ft.

Montcalm County, Cato Township: Gordon Oil Co. 1 Paul Paris, SE NW NW 6, dry in Monroe, TD 3,544 ft.

Ogemaw County, Logan Township: Sun Oil Co. 1 Frank Holshoe, C N½ SW SE 17-22n-4e, dry at 4,537 ft., plugged back to Berea at 1,663 ft. for natural gas well (700,000 cu. ft.)

Sanilac County, Moore Township: Herdell & Merrill 1 Frank Pringle, NE SE NW 2-12n-13e, dry in Dundee, TD 3,001 ft.

ILLINOIS

Jefferson County Test Makes 360 Bbl. Oil, 100 Bbl. Water

CENTRALIA. — Fifty-eight new operations in Illinois were reported in the past week as against 49 completions, including 29 oil wells and 20 dry holes. The banner well of the week was Phillips Petroleum Co.'s 5 Tuley, SW NE NE 21-6s-10e, mentioned previously as having extended the Concord pool in White County. On its completions test it was credited with 706 bbl. in 24 hours.

Six miles south of Albion in Edwards County, Rock Island Refining Co. 1 L. G. Chalcraft, NW SE NW 12-3s-10e, in the Albion Consolidated pool, swabbed 793 bbl. of oil and 41 bbl. of water in 16 hours from Biehl sand (Pennsylvanian) at 1,972-2,004 ft. It was not yet a completion.

British American Oil Co. 1-A Lissner, SW SW SE 19-1s-2e, a wildcat, was completed in Benoist sand at 2,039-46 ft., which was shot with 15 qt. It pumped 360 bbl. of oil and 100 bbl. of water in 24 hours, then made 267 bbl. of oil and 144 bbl. of water in another 24 hours. Of the eight wildcats completed seven were dry.

New wildcat operations reported were as follows: Fox & Fox 1 Cassens, NE NW SE 14-5n-7w of fourth principal meridian, Hancock County; A. S. Keating 1 E. M. Gibson, NW SW NE 9-10n-7e, Cumberland County; S. D. Jarvis 1 Old Ben Coal Co., SE NE SE 29-5s-2e, Franklin County; Texas Co. 1 Inland Steel Co., SE SW SW 25-4s-1e, Jefferson County; Northern Ordnance Co. 1 G. E. Champion, NE NE SW 9-6n-3w of fourth principal meridian, Schuyler County; Superior Oil Co. 1 Cowling, SE SW NE 21-1s-14w, Edwards County; Superior 1 F. E. Puckel, NW NE SW 23-3s-8e, White County; Sinclair Wyoming Oil Co. 1 J. E. Millner, NW NE SW 31-1n-6e, Wayne County; Roy Powers 1 Freeman, SW NE SE 23-2n-8e, and Pure Oil Co. 1 T. S. Gray, SE SW SE 9-4n-9e, Richland County.

ILLINOIS WILDCAT COMPLETIONS

Jefferson County: British American 1-A Lissner, SW SW SE 19-1s-2e, Benoist sand 2,039-46 ft., shot with 15 qt., pumped 360 bbl. oil and 100 bbl. water in 24 hours, later 267 bbl. oil and 144 bbl. water.

Oberling & Eason 1 fee, SW NW NE 17-2s-1e, dry at 2,214 ft., upper Glen Dean 1,496 ft., Cypress 1,773 ft., Benoist 1,995 ft., Aux Vases 1,971 ft., Fredonia 2,131 ft.

McDonough County: Charles E. Walters 1 H. Twidewell, SE SE NW 33-4n-3w, fourth principal meridian, dry at 1,027 ft., Trenton lime top 823 ft., acidized at 918-36 ft.

Madison County: L. Alch 1 J. O. Gonterman, NE NW NW 21-4n-7w, dry at 2,338 ft., Ste. Genevieve lime 730 ft., St. Louis 780 ft., Keokuk 1,040 Louisiana 1,603 ft., Chattanooga 1,625 ft., Devonian 1,682 ft., Silurian 1,840 ft., Trenton 2,238-2,326 ft.

Schuyler County: Northern Ordnance Co. 1 Payne, SE SE NE 3-2n-2w, fourth principal meridian, dry at 756 ft.

White County: Gillam and J. W. Carter 1, Pearson estate, SW SE SE 14-4s-9e, dry at 3,365 ft., lower Kincaid 2,169 ft., Paint Creek 3,017 ft., Benoist 3,082 ft., Aux Vases 3,185 ft., Ste. Genevieve 3,214 ft., Fredonia 3,280 ft.

Central Pipe Line 1 S. D. Reding, SE SW SW 5-4s-9e, dry at 3,565 ft., no log.

T. O. Wall 1 Brostel-Miller, NW SE NW 19-3s-11e, dry at 3,172 ft., lower Kincaid 1,991 ft., Cypress 2,753 ft., Benoist 2,939 ft., Aux Vases 2,978 ft., McClosky 3,159 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Oct. 14 crude oil	Distillate, allied products	October PAW quota all oils	Oct. 7 crude oil
Arkansas	80,800	4,500	83,000	80,500
California	892,500	51,100	937,300	886,750
Colorado	9,100	.....	8,500	8,900
Eastern	67,000	6,100	80,200	69,500
Illinois	204,700	11,500	217,100	194,800
Indiana	12,400	.....	13,500	13,300
Kansas	267,900	4,300	280,000	251,300
Kentucky	24,800	2,500	27,800	24,400
Louisiana	363,200	35,000	385,000	363,500
North Louisiana	73,400	.....	.....	74,050
South Louisiana	289,800	.....	.....	289,750
Michigan	52,200	400	50,500	51,900
Mississippi	45,800	.....	46,000	49,250
Montana	23,950	200	22,300	23,950
Nebraska	950	.....	1,000	950
New Mexico	104,000	5,500	115,500	103,900
Oklahoma	345,250	27,000	366,800	344,050
Texas	2,133,400	138,000	2,278,000	2,133,350
East Texas	371,400	.....	.....	371,350
East Central Texas	149,550	.....	.....	149,500
North Central Texas	148,700	.....	.....	148,800
Texas Panhandle	98,850	.....	.....	98,800
West Texas	492,700	.....	.....	492,800
South Central (S. A.)	19,800	.....	.....	19,750
South Texas (Laredo)	77,900	.....	.....	77,800
Lower Gulf Coast	236,800	.....	.....	236,850
Upper Gulf Coast	537,650	.....	.....	537,700
Wyoming	93,700	3,000	98,300	96,650
Total United States	4,721,650	289,100	5,010,800	4,697,350
Change from previous week	up 24,300	.....	.....	.....

Total production January 1-October 14, 1944 ..... 1,304,470,800 bbl.
Same period last year ..... 1,159,249,300 bbl.

ROCKY MOUNTAIN

Wyoming Leads in Number Of Geographical Crews

DENVER. — A survey of geophysical work under way in the Rocky Mountain area shows that 69 crews were in the field on September 15, Wyoming far in the lead with 51. Other states showed: Montana 9, Colorado 6, western Nebraska 2, western South Dakota 1. Of these crews 38 were seismograph, 27 were gravity meter, and 4 were magnetometer crews. They were in the employ of 22 companies.

Deep test at Oregon Basin.—Kirk Oil Co. has made location for 1 Unit 5, SW SW SE 29-51n-100w, South Oregon Basin field, for a test through all horizons to the granite. It is ½ mile east of Ohio Oil Co. 5 Hallene, which was reported to have encountered saturation in the Big Horn of the upper Ordovician, but concerning which no official information has been released.

Alkali Creek location. — Mountain Fuel Supply Co. is spudding in a test of the Wasatch formation to around 4,500 ft. in

IF IT'S A RODGERS IT'S THE BEST IN HYDRAULICS

"OUR RODGERS TAMED THAT BULLDOZER IN 4 HOURS FLAT!"

NO. 19 OF A "READY-WITH-A-RODGERS" SERIES

"The first job our Rodgers Track Press did for us opened our eyes. It was on a bulldozer that needed new track bushings—a job that used to take at least a couple of days.

"In four hours flat, that bulldozer was all fixed up snug and tight with new pins and bushings, ready to go to work. We don't mind track repairs any more—our Rodgers takes 'em all in stride."

This experience is typical—maintenance men agree that the Rodgers Track Press shortens layups for tractor repairs—saves time and money. It will pay you to get the full story on the Rodgers Track Press . . . write or wire for complete information and prices. *If it's a Rodgers, it's the best in hydraulics.* Rodgers Hydraulic, Inc., Dept. L-10, St. Louis Park, Minneapolis 16, Minnesota.

RODGERS HYDRAULIC, Inc.

its 1 Unit, C SE SW 18-13n-99w, Alkali Creek structure, Sweetwater County, Wyoming, a joint operation with the Alkali Creek Oil & Gas Co. The unit comprises 13,750 acres, all government land. Location is ⅛ mile southwest of a well drilled 17 years ago by Prairie Oil & Gas Co. which had gas at 3,625 ft., but was abandoned for lack of a market at that time.

To drill historic site.—The Texas Co. has made a location in 1 Clark, NE NE SW 35-33n-82w, Oil Mountain district, southwest of Casper, for a test to the Madison. It is near an oil seep "located" in 1851 and owned by Kit Carson, James Baker and half-breed Indians who mixed the oil with flour, transported it to the California trail on ponies and sold it to emigrants at $1 a quart for use as axle grease. One well, drilled on the structure to the Tensleep at 3,200 ft. in 1918, found that horizon water-bearing.

Husky to test Cedar Ridge.—Husky Refining Co., which recently made a discovery on the Half Moon structure, west side of the Big Horn Basin, has moved south for another wildcat on the Cedar Ridge structure, in Hot Springs County, 8 miles south of the Continental Oil Co. discovery at Gebo. Location is 1 Government, NE NE NE 28-43n-95w. It will go to the Tensleep.

Madison test at Mahoney.—Sinclair-Wyoming Oil Co. has made location for 7-C Unit, NE 34-26n-88w, on Mahoney dome, Carbon County, Wyoming, for a test to the Madison lime.

Sheldon dome wildcat.—Kerlyn Oil Co. 1 Shoshone, C NE NE 16-5n-2w, Sheldon dome, Fremont County, Wyoming, joint with Carter Oil Co., is drilling at 5,155 ft. in the Jelm sand in the base of the redbeds on its way to the Tensleep. In a drill-stem test at 4,922 ft. it recovered 100 ft. of gas-cut mud.

Oil in water well.—Plymouth Oil Co., drilling a water well for a deep test in 1 Santa Fe, C SW NW 13-15n-10w, Walker dome, McKinley County, New Mexico, encountered a show of oil estimated at 10 bbl. per day at 983 ft., which was cased off. The hole was deepened to 1,400 ft. where a good supply of water was found.

Nebraska wildcats.—Texas 1 Taunton, SE NW NW 22-2n-35w, Stratton district, Hitchcock County, Nebraska, was abandoned in pre-Cambrian granite at 4,663 ft. Rig was moved to the Hamlet Prospect 1 Egle, SE SE SW 29-4n-35w, same county, and is drilling at 2,480 ft.

MONTANA WILDCAT COMPLETION

Carbon County, Roscoe: R. C. Tarrant 2 McKay, SE NW 4-6s-18e, TD 4,165 ft., top Madison 4,160 ft., sulfur water, dry.

YOU'LL FIND A HUNDRED-AND-ONE USES FOR THIS ADJUSTABLE
RIG BRACE
Easy to take down!
Easy to move!
Adjustable to any bracing job around drilling rig and lease!
Less expensive than home-made fabricated braces—yet you'll find this heavy, all-steel, rigid, American Adjustable Rig Brace is adjustable to many jobs! Contractors use it to brace pumps, engines, substructures, reverse clutch, draw-works and in dozens of other bracing jobs about a drilling unit. Producers use this brace on pumping powers, heavy pump jacks, swing posts, separator installations and in many other similar jobs on leases. Write for further information now!
AMERICAN
IRON AND MACHINE WORKS CO.
OKLAHOMA CITY, OKLAHOMA
Houston and Monahans, Tex.; Harvey and New Iberia, Louisiana; Great Bend, Kansas. Export office: 420 Lexington Ave., New York City
California Representative:
Hopper Mch. Wks., Inc., Bakersfield, Cal.
WE'RE SERVING
UNCLE SAM, TOO
Not only has the American Iron & Machine Works Co. been doing its best to meet the needs of the oil industry, but we've also been up to our ears in war work.

OHIO, KENTUCKY

Morgan County Wildcat Opens New Gas Pool

COLUMBUS.—A 1,610,000 cu. ft. wildcat completion by Foraker et al southeast of Crooksville will encourage further drilling in the western part of York Township, Morgan County. The well, on the New York Coal Co. fee, Sec. 34, had sand at 3,782 to 3,822 ft. and a rock of 1,100 lb.

The Granger pool in Medina County was extended to the south and east by two Ohio Fuel Gas Co. completions. E. B. Shade 1 Lot 60, gaged 618,000 cu. ft. in the shell and Clinton, while 1 C. A. Geiss, Lot 37, gaged 592,000 cu. ft. in the shell and Clinton.

The Bedford oil pool in Meigs County was extended ¾ mile to the south by Preston Oil Co. 1 Margaret Hauck, Section 2. Berea sand was drilled from 1,619-30 ft. and the well flowed 20 bbl. and swabbed 5 bbl. in 24 hours.

An unusual producer was completed in the old Injun field by Newhart Oil Co. on the Dickson fee, Section 5, Ludlow Township, Washington County. The well flowed 80 bbl. in 12 hours with 265,000 cu. ft. of gas.

The Texas Co. 1 H. B. Clark et al, Union Township, Belmont County, a test projected to 9,000 ft. is drilling around 2,000 ft. It was inadvertently reported drilling at 9,000 ft. in the October 7 Journal.

OHIO WILDCAT COMPLETIONS

Medina County, Homer Township: Ohio Fuel 1 L. L. Hummel, Sec. 11, Clinton dry, TD 2,853 ft.

Morgan County, York Township: Foraker et al 1 New York Coal, Sec. 34, Clinton 3,782-3,822 ft., 1,610,000 cu. ft. gas, TD 3,823 ft.

WESTERN KENTUCKY

OWENSBORO, Ky.—A promising wildcat in Webster County, 2 miles south of Poole, in Ross Bartmes 1 Leora Wilson, 17-N-23, 4 miles from other production. A core test of Tar Springs sand at 1,909-08 ft. indicated a possible 125 to 200-bbl. well. No drill-stem test had been made. Tar Springs sand was bottomed at 1,920 ft., total depth 1,922 ft.

Walters, Hodges & Blalack 1 Sam F. Clements, 2,000 ft. east of production in the Uniontown pool in Union County, gave promise of an extension of the producing area. A 1-hour drill-stem test of Cypress sand at 2,296-2,304 ft. developed 900 ft. of oil. Total depth was 2,304 ft. and still in Cypress sand.

Eight oil wells and five dry holes were reported completed in Western Kentucky during the week.

WESTERN KENTUCKY WILDCAT COMPLETION

Union County: Sohio 1 Tucker, SW NE SW 14-0-20, dry at 2,758 ft. after penetrating McClosky lime.

EASTERN KENTUCKY

ASHLAND.—Operations in Eastern Kentucky maintained a steady pace during the past week but completions dropped to a low point with two gas wells drilled in.

Field reports indicate that three or four more wells have reached or are near the total depth level and should be reported as completed next week.

Inland Gas Corp. has completed well No. 254 on the Harve Spears tract on Buffalo Creek in Floyd County at a total depth of 1,460 ft. in Big Lime with a daily open flow estimated at 750,000 cu. ft. of gas.

Kentucky West Virginia Gas Co. has completed well No. 5552 on the Anthony Howell land on Mink Branch of Big Mud Creek in Floyd County at a total depth of 2,990 ft. in shale with a daily open flow of 158,000 cu. ft. of gas.

INDIANA

EVANSVILLE, Ind.—Eight completions, five oil wells and three dry holes were recorded in Indiana fields in the past week. One wildcat completion was dry.

INDIANA WILDCAT COMPLETION

Spencer County: Texas 1 J. Bettag, SE SE NW 25-4s-5w, dry at 536 ft. Tar Springs sand at 510-36 ft. was shot with 15 qt.

APPALACHIAN FIELD

Large Gas Well Completed in Allegheny

PITTSBURGH.—In southwest Pennsylvania, John Wally completed a large gas well on the Harper estate 1 mile west of Monroeville in Patton Township, Allegheny County, with a gage of 4,000,000 cu. ft from the Speechley sand topped at 3,290 ft. and first gas 3,293 ft., total depth 3,330 ft. There have been some Speechley sand gas wells in the area but none recent nor large.

In Crawford County, Appalachian Development Co. increased the flow of Oriskany gas from 75,000 cu. ft. in the top of the sand to 750,000 cu. ft. at 2,390½ ft. which decreased to 192,000 cu. ft. as drilling continued. The decrease may possibly have been due to freezing at the sand as is usual in Oriskany wells. The gas was cased off and deepening resumed. The Oriskany top is 2,388 ft., bottom 2,394 ft.

In Butler County, Manufacturers Light & Heat Co. test on the J. G. Hockenberry farm in Mercer Township is drilling at 9,740 ft. in the St. Peter.

In Preston County, West Virginia, Wm. E. Snee et al topped the Oriskany sand at 5,845 ft. in the wildcat on Harry Sisler farm in Portland district and at 5,884 ft. there was no showing of gas with a sand appearing tightly calcited. Drilling is continuing through the Oriskany until the Helderberg is identified.

In Raleigh County, where wildcatting activity is high as well in neighboring Wyoming County, Godfrey L. Cabot, Inc. completed a test on J. Levi Cook in Trap Hill district with a gage of 1,055,000 cu. ft. gas. The Big Lime was topped at 2,655 ft., gas 2,726-35 ft., gas 2,735-49 ft., acidized with 1,000 gal., rock pressure 555 lb. 60 hours, total depth 2,801 ft.

Specify 'Harrisburg' for Seamless Steel Couplings, Pump Liners and Drop Forged Steel Pipe Flanges

Combining the skill of the modern mechanic with steel of a special fitness for the job in hand, Harrisburg also makes sure of the threading operation, so important in coupling and flange manufacture. They are strip-proof and unsurpassed for uniformity of form, height, angle and lead. Harrisburg Slush Pump Lines have a gun-barrel finish and have long been accepted for their long-wearing quality.

Other Harrisburg Products:

Alloy and Carbon Steels: Seamless Steel High Pressure Cylinders and Liquefiers; Hollow and Drop Forgings; Pipe Coils and Bends, Aerial Bombs.

• • •

THIS 102-PAGE CATALOG IS FREE SEND FOR IT

Contains official S. A. E. Standard Specifications; Information on Cylinders, Flanges, Couplings, Pump Liners. Up-to-date data on the Liquefier. Well illustrated. An important reference book to have in your possession.

HARRISBURG STEEL CORPORATION
HARRISBURG, PENNSYLVANIA

HARRISBURG *Oil-Field* **PRODUCTS**

SOUTHWEST TEXAS

Texas Co. Dual Completes Tijerina Field Well

CORPUS CHRISTI.—Tex Co. 8 T. J. Tijerina, in Tijerina field of Jim Wells County, originally completed in perforations at 7,157-64 ft., flowing 252 bbl. daily ½-in. choke, tubing pressure 1,925 lb., gravity 36.7, gas-oil ratio 960 to 1, has been dual-completed in the pay topped at 7,089 ft. Perforations were made from 7,098-7,104 ft., 24 shots, and the upper pay flowed potential of 220 bbl. daily on 7/64-in. choke, casing pressure 1,750 lb., gas-oil ratio 1,150 to 1, gravity 43.3.

Standard Oil Co. of Texas is reported to have pulled all the 5½-in. casing from the 4 Braulia G. de Garcia, wildcat 1½ miles southeast of the Alta Mesa field, Brooks County, cleaned out to 6,880 ft., and to be preparing to set plug to test upper sands. Total depth of the hole is 8,106 ft., with 5½-in. set at 8,074 ft. It was previously reported to have shown some gas condensate in open hole, with gas condensate and salt water in perforations 7,387-7,400 ft.

Humble Oil & Refining Co. 1 E. M. Baker, wildcat about 7 miles south of San Caja field in McMullen County, is running drill-stem test with total depth 6,477 ft. in sand. Operator failed to get successful test on first attempt at this level.

Humble continues to test at the 1 Lockwood, in Atascosa County, after drilling out in the Edwards lime to 6,905 ft., total depth 6,919 ft. It had tested higher in the hole and the lime was acidized before drilling out to test at the present level. This is second test for this area, and is 3,900 ft. southwest of the 3 Pruitt discovery well, at Charlotte field.

H. H. Howell 1 D. C. Perkins et al, wildcat on Los Presenos Survey, 5 miles southeast of Alice, is dry after running log to total depth of 6,009 ft.

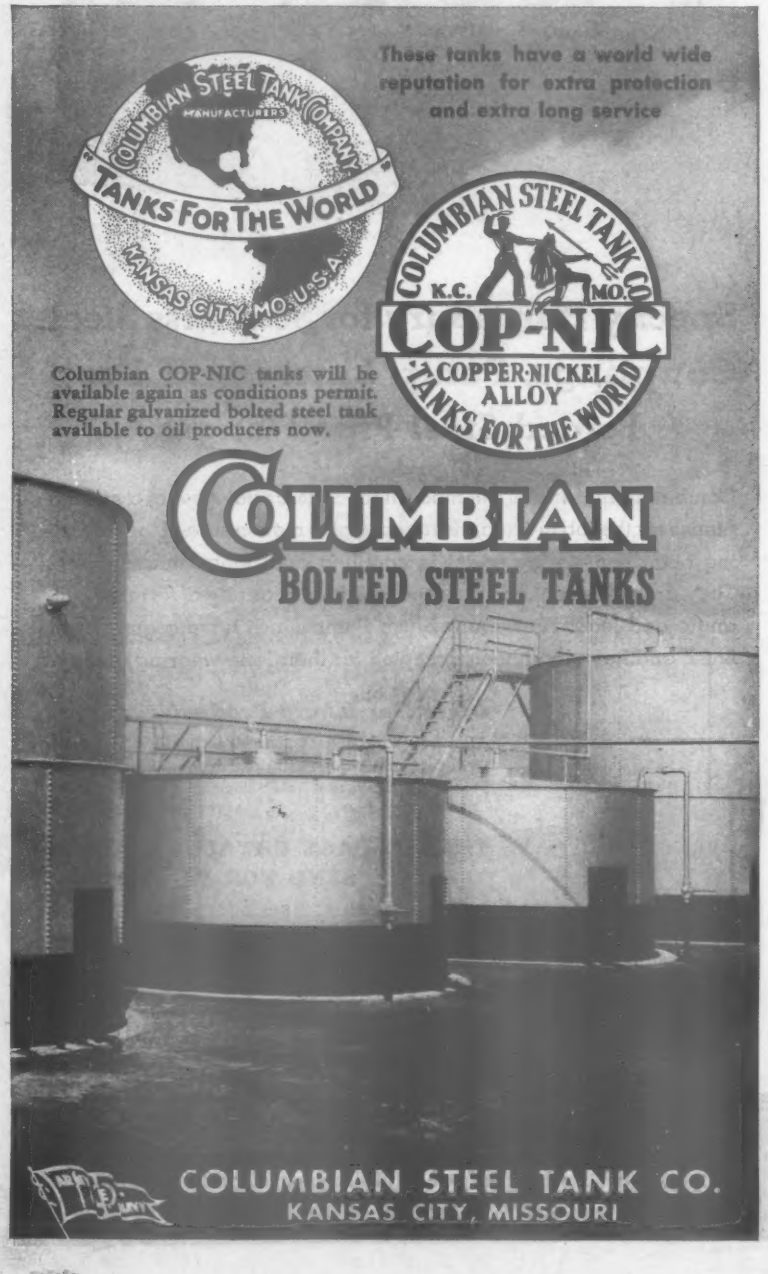
Continental Oil Co. 1 Kittie West Schreiner, wildcat about 5 miles south of Kittie, Live Oak County, is waiting on cement after setting 10¾-in. casing at 2,602 ft.

SOUTHWEST TEXAS WILDCAT COMPLETIONS

Bastrop County: Continental Oil Co. 1 H. H. Young et al, 3 mi. southwest of Kirtley, in William Medford Sur. A-49, dry at 4,240 ft.

Jim Wells County: H. H. Howell 1 D. C. Perkins et al, 5 mi. southeast of Alice, Los Presenos grant, dry at 6,009 ft.

Nueces County: Stanolind Oil & Gas Co. 2 Katherine Luby Shaffer, 7½ mi. southeast of Driscoll, Mary J. Luby subdivision of Petronilla Ranch, dry at 8,006 ft.


These tanks have a world wide reputation for extra protection and extra long service
COLUMBIAN STEEL TANK COMPANY
MANUFACTURERS
TANKS FOR THE WORLD
KANSAS CITY, MO. U.S.A.
COLUMBIAN STEEL TANK CO.
K.C. MO.
COP-NIC
COPPER-NICKEL ALLOY
TANKS FOR THE WORLD
Columbian COP-NIC tanks will be available again as conditions permit. Regular galvanized bolted steel tank available to oil producers now.
COLUMBIAN
BOLTED STEEL TANKS
COLUMBIAN STEEL TANK CO.
KANSAS CITY, MISSOURI

EASTERN TEXAS

Scattered Wildcats Keep Exploration Interest High

DALLAS.—Routine progress reports make up the bulk of current field news from the East Texas district. However, approximately one-third of the total of 75 operations under way throughout the district are wildcats, holding the possibility that important news may develop any day. Locations for two new wildcats were reported last week. In Henderson County, Wiggins and Hyde-Faulk & Coleman, 2½ miles southwest of Larue, in the A. W. Brown Survey, will test the Woodbine sand. In Robertson County, Hammon Oil Refining Co. staked 2 P. C. Bigson, 950 ft. northeast of their 1 Gibson, 5 miles west of Calvert in the J. Webb Survey, to test the shallow Nacatoch sand.

Northern Ordnance, Inc. 1 Shelton, in the Martin's Mill area of Van Zandt County, was preparing to swab after using 2,500 gal. of acid through casing perforations at 8,278-90 ft., in the Rodessa section. No test was made prior to using acid. In same county, The Texas Co. 1 Stout, Tundra area, topped Woodbine by samples between 4,378-88 ft. and was drilling below 4,500 ft. with no shows. It will test the Rodessa and lower zones.

Field development in the district is sporadic, with more rigs at work in the New Hope field, Franklin County, than elsewhere. Drilling reports show 13 operations now under way at New Hope; 8 in the Pittsburgh field, Camp County, and 12 in the gas areas of Panola County.

EAST TEXAS WILDCAT COMPLETIONS

Ellis County: Lasco, Inc. 2 (1) R. L. LeSage, H. Luckey Sur., 5 mi. NW Italy, dry, TD 2,555 ft.

Freestone County: George Anderson 1 Gussman & Hess, Navarro Sur., 4 mi. W Fairfield, elev. 366 ft., dry, TD 4,279 ft.

Harrison County: Rogers Lacy 1 Verhalen Nursery, A. Poe Sur., A-19, 1½ mi. E Scottsville, elev. 415 ft., Paluxy 3,357 ft., James 5,935 ft., Pettit 6,225 ft., dry, TD 6,728 ft.

Panola County: Rogers Lacy 1 J. W. Cooke, Antwine Duboiac, Jr., Sur., A-161, 8 mi. NE Beckville, elev. 303 ft., Pettit 5,935 ft., Travis Peak 6,279 ft., flowed 78,000,000 cu. ft. gas a day, TD 7,010 ft.

Ann-Lacy Lillard 1 C. L. Turner, W. A. LaGrone Sur., 10 mi. N Carthage, elev. 236 ft., James 5,602 ft., Travis Peak 6,232 ft., flowed 175,000,000 cu. ft. gas a day, TD 6,608 ft.

Wood County: Sohio Petroleum Co. 1 Little Sandy H&F Club, Hamblin Sur., 4¼ mi. W Hawkins, elev. 308 ft., Woodbine 5,046 ft., Goodland 7,010-20 ft., Paluxy 7,116-21 ft., dry, TD 7,175 ft.

PERMIAN BASIN

Two Wildcats Show Productive Possibilities

MIDLAND.—Two West Texas wildcats promising production from the old, established upper Permian lime edged their way last week into the exploration picture where chief interest has been turned to Lower Permian and pre-Permian development.

In southwestern Andrews County, Sun Oil Co. 1 Martin, Section 17, Block A-41, PSL Survey, made a 2½-hour drill-stem test from 4,326-56 ft., had slight blow of air, recovered 60 ft. of oil and gas-cut mud and about 1 gal. of live, green oil. It was coring ahead. Started as an Ellenburger test, it has been running high on all markers and appears to have a good chance to find more saturation and porosity in the present pay zone before striking the water level.

In northwestern Dawson County, Richmond Drilling Co. 1 Nelson, 2 miles north of the lone small producer in the Welch pool, drilled broken lime showing oil at 4,805-54 ft., and on a test at 4,878 ft. swabbed 54 bbl. of oil in 18 hours, recovering 1 bbl. per hour during the last 14 hours. It was drilling ahead at 4,900 ft., with water sand reportedly encountered at 4,878-81 ft.

Lion Oil Refining Co. 1 University-Word, 3 miles west of Pyote in Ward County, looked good for 150 to 200 bbl. of oil daily while cleaning out after nitro shot at 4,975-90 ft. in the Delaware sand, total depth 4,994 ft.

In northern Crockett County, Standard Oil Co. of Texas 1 University, a wildcat 8 miles northeast of the World field and in Section 25, Block 12, was preparing to test at 2,376 ft., with several oil shows encountered above that point. Humble Oil & Refining Co. 1 Parrot, Upton County wildcat which has indicated possible Lower Permian production from a zone just above 7,700 ft., was bottomed at 7,750 ft., fishing for tools lost while reaming 8¾-in. hole to 7,638 ft.

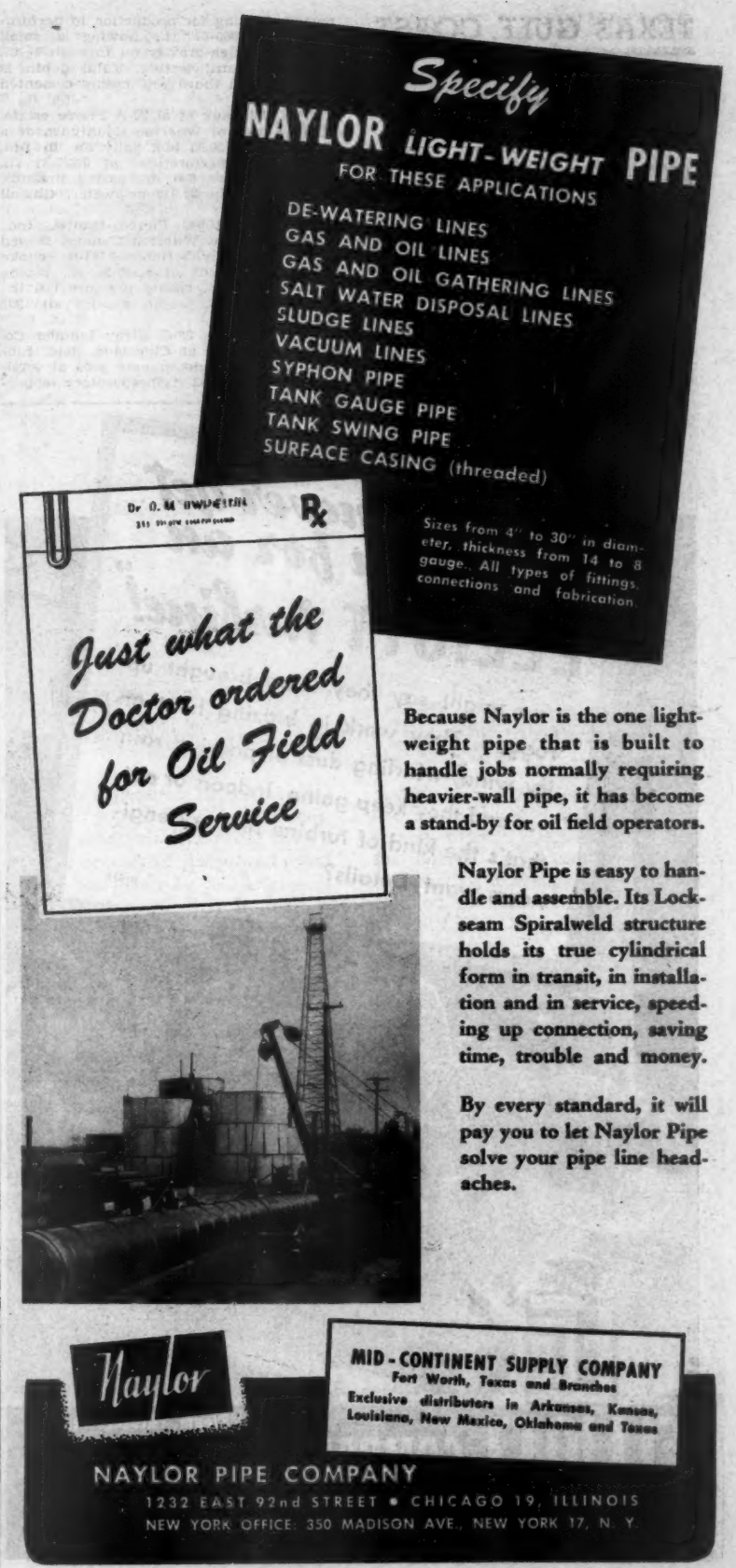
WEST TEXAS WILDCAT COMPLETION

Pecos County: Humble Oil & Refining Co. 1-B O. W. Williams et al, Sec. 20, Blk. 119, GC&SF Sur., 6½ mi. NW Fort Stockton, elev. 2,845 ft., Yates 2,865 ft., top pay 2,875 ft., plugged back to 2,925 ft., pumped 143 bbl. day through 2-in. tubing, gas-oil ratio 342 to 1, gravity 35.5, TD 3,002 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Humble Oil & Refining Co. 1 Federal-Leonard Oil Co., deepest producer yet found in the Permian basin, was setting production string with total depth 11,969 ft. Before establishing water table by showing 460 ft. of sulfur water on a 2-hour drill-stem test at 11,948-69 ft. it showed for a heavy producer from Ellenburger lime, topped at 11,816 ft., flowing at the rate of 20 bbl., 77 bbl., and 51 bbl., respectively, on three separate drill-stem tests made at different levels in the pay section.

Gulf Oil Co. 1 Vivian (Drinkard), lower Permian discovery on the east flank of the Eunice area, Lea County, has cemented casing at 6,508 ft. and will test the 6,400-ft. pay zone this week. Ohio Oil Co. is planning to drill a 7,500-ft. wildcat, No. 1 W. H. Jones, SW SW 19-19-39, approximately 22 miles north of the Gulf discovery.


Specify
NAYLOR LIGHT-WEIGHT PIPE
FOR THESE APPLICATIONS
DE-WATERING LINES
GAS AND OIL LINES
GAS AND OIL GATHERING LINES
SALT WATER DISPOSAL LINES
SLUDGE LINES
VACUUM LINES
SYPHON PIPE
TANK GAUGE PIPE
TANK SWING PIPE
SURFACE CASING (threaded)
Sizes from 4" to 30" in diameter, thickness from 14 to 8 gauge. All types of fittings, connections and fabrication.
Rx
Just what the Doctor ordered for Oil Field Service
Because Naylor is the one lightweight pipe that is built to handle jobs normally requiring heavier-wall pipe, it has become a stand-by for oil field operators.
Naylor Pipe is easy to handle and assemble. Its Lockseam Spiralweld structure holds its true cylindrical form in transit, in installation and in service, speeding up connection, saving time, trouble and money.
By every standard, it will pay you to let Naylor Pipe solve your pipe line headaches.
Naylor
MID-CONTINENT SUPPLY COMPANY
Fort Worth, Texas and Branches
Exclusive distributors in Arkansas, Kansas, Louisiana, New Mexico, Oklahoma and Texas
NAYLOR PIPE COMPANY
1232 EAST 92nd STREET • CHICAGO 19, ILLINOIS
NEW YORK OFFICE: 350 MADISON AVE., NEW YORK 17, N. Y.

TEXAS GULF COAST

Amerada Wildcat Discovery Flows 80 Bbl. Daily

HOUSTON.—Amerada Petroleum Corp. 1 Chas. J. P. Daboval, wildcat discovery about 8 miles southwest of El Campo in Wharton County, flowed 80 bbl. daily on Railroad Commission potential test through ¼-in. choke from perforations 7,025-28 ft., top of sand 7,025 ft. Total depth of the hole is 7,430 ft. with 5½-in. casing set to 7,145 ft. Tubing pressure 2,150 lb., gravity 46.7°, no water, with gas-oil ratio 6,570 to 1.

About 2½ miles north of the East Mauritz field, in Wharton County, Sam G. Harrison 1 Gus L. Schulze, wildcat, is reported showing for production in perforations at 5,560-67 ft., flowing a small amount of high-gravity oil through ⅛-in. choke and still testing. Total depth is 6,510 ft., with the 5½-in. casing cemented at 5,665 ft.

F. W. Michaux et al 80-A Pierce estate, Withers area of Wharton County, made a potential of 130.93 bbl. daily on 10/64-in. choke from perforations at 5,325-31 ft., tubing pressure 300 lb., casing pressure 650 lb., gravity 25.9°, no water. Gas-oil ratio 246 to 1.

Texas Co. 114-C Pierce Estates, Inc., Withers area of Wharton County, flowed 130.78 bbl. daily through 9/64-in. choke from perforations at 5,330-34 ft., tubing pressure 500 lb., casing pressure 600 lb., gravity 25.8°, no water, gas-oil ratio 287 to 1.

Gulf Oil Corp. 22-C Kirby Lumber Co. et al, deep test at Cleveland field, Liberty County, made squeeze jobs at 9,036-38 ft., and 9,060-62 ft., preparatory to perforating for production test, probably between these two levels. Total depth is 12,523 ft. in shale with 5½-in. casing set on bottom.

Magnolia Petroleum Co. & Abercrombie 2 R. D. McDonald, Old Ocean field, Brazoria County, flowed commission potential of 310.3 bbl. daily on 16/64-in. choke, gas-oil ratio 45,615 to 1, gravity 55.2°, tubing pressure 1,975 lb., no water, from perforations at 9,578-9,618 ft. Top of sand 9,570 ft., total depth 10,850 ft.

Sun Oil Co. 1 W. L. Evans, North Winnie field in Chambers County, with total depth 10,700 ft., perforated at 9,434-51 ft., flowed at the rate of 61 bbl. condensate daily on 12/64-in. choke, 3,124,000 cu. ft. gas through 12/64-in. choke, gas-oil ratio 51,213 to 1, gravity 49.3°. Tubing pressure 3,750 lb., 2⅜-in. tubing set at 9,431 ft., estimated 47,000,000 cu. ft. gas daily open flow. This well is 1,155 ft. southwest of Sun's 1 Dougherty "pool," discovery well of the area, which was completed as an oil producer in perforations at the 8,757-ft. level.

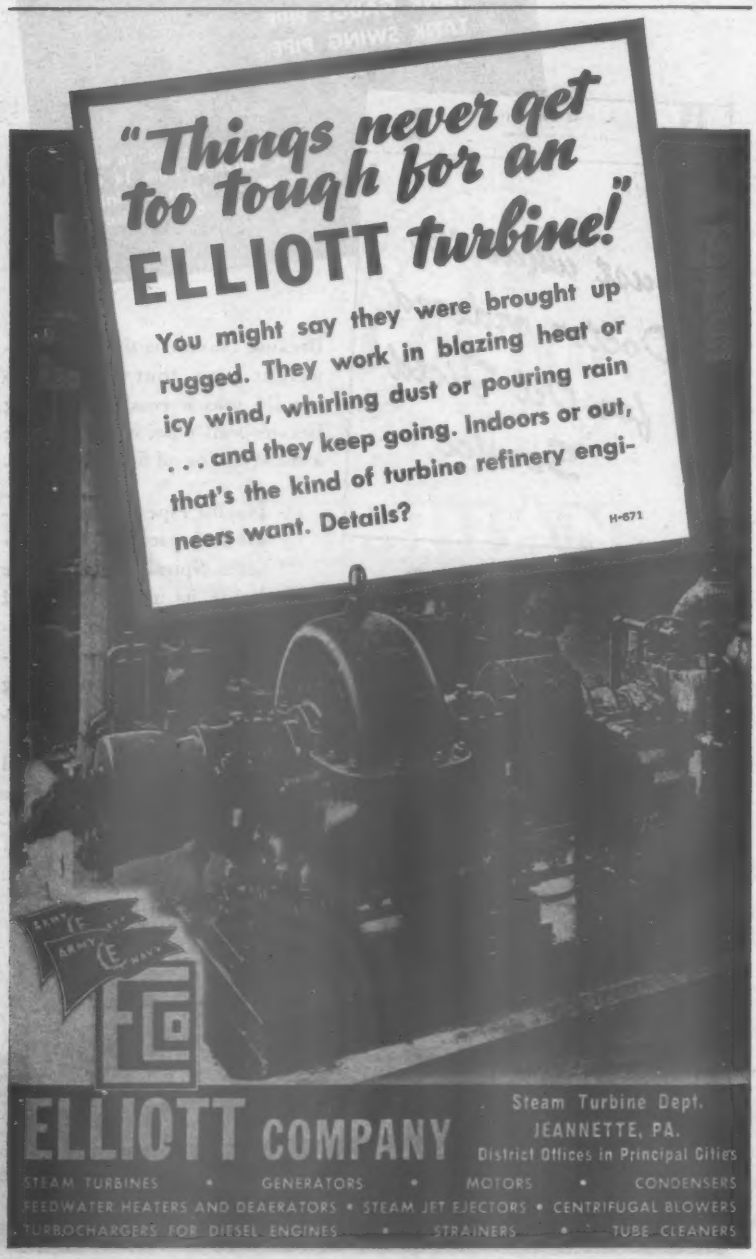
Skelly Oil Co. 1 Ida Little, Francitas field in Jackson County, is completing in perforations 7,395-98 ft., flowing 141 bbl. in 16 hours, 12½ hours on 5/32-in. choke and 3½ hours on ½-in. choke, tubing pressure 1,050 lb., casing pressure 1,450 lb., 2-in. set at 7,395 ft. Total depth is 8,009 ft., with 5½-in. casing set at 7,990 ft.

UPPER GULF COAST WILDCAT COMPLETIONS

Fayette County: Phillips Petroleum Co. 1 Cora Cockrill, 3 mi. southwest of Cistern, in James Robinson Sur., dry at 3,003 ft.

Matagorda County: Atlantic Refining Co. 2-C Denman Kountze, West Markham area, Henry Parker Sur., dry at 6,650 ft.

Wharton County: Amerada Petroleum Corp. 1 Chas. J. P. Daboval, discovery, 8 mi. southwest of El Campo, in E.T.R.R. Sur., A-495. Total depth 7,430 ft., perforations 7,025-28 ft., PT 80 bbl. dry ⅛-in. choke, gas-oil ratio 6,570 to 1, tubing pressure 2,150 lb., gravity 36.7°, no water.


"Things never get too tough for an ELLIOTT turbine!"
You might say they were brought up rugged. They work in blazing heat or icy wind, whirling dust or pouring rain . . . and they keep going. Indoors or out, that's the kind of turbine refinery engineers want. Details?
H-671
ELLIOTT COMPANY
Steam Turbine Dept.
JEANNETTE, PA.
District Offices in Principal Cities
STEAM TURBINES • GENERATORS • MOTORS • CONDENSERS
FEEDWATER HEATERS AND DEAERATORS • STEAM JET EJECTORS • CENTRIFUGAL BLOWERS
TURBOCHARGERS FOR DIESEL ENGINES • STRAINERS • TUBE CLEANERS

CANADIAN FIELDS

Important Development Indicated in Kent County

CHATHAM. — A development of some importance is indicated in Kent County, Ontario, a short distance north and west of the old Bothwell shallow field. Over a year ago the Union Gas Co. drilled in Lot 12, Concession 4, Zone Township, several miles west of Bothwell, encountering gas with an initial flow of 974,500 cu. ft. at 1,650 ft. depth. Since then upwards of 20 wells have been drilled, the field gradually working eastward till the latest wells are drilling close to the town of Bothwell. In the eastern portion of the new field a considerable proportion of dry holes alternated with gassers; but toward the east the production has improved. The gas comes from the Guelph-Niagara formation, which is the producing horizon in the Dawn field to the northwest and the Chatham Township field to the west. A recent well close to Bothwell encountered shallow oil, apparently in the Onondaga limestone, the main producing horizon of the Bothwell shallow field, with initial production reported at 100 bbl.

Steveville. — In the Steveville-Princess area of the Alberta plains, east of Calgary, California-Standard (Princess-C.P.R.) 8, LSD 16, 21-20-12w4, bottoming in the Devonian limestone at 3,983 ft., has encountered oil in apparently commercial quantities, with no water reported. The strike has revived interest in the Steve-

ville area, and in the possibilities of the Devonian limestone in the plains section of the province. I. W. C. Solloway and A. E. Goyette, following radar exploration tests last year, are drilling in LSD 8, 30-20-7w4, in a possible extension of the producing area to the east; and are making two additional locations.

CALIFORNIA

Possible Gas-Cap Well Completed in Kern County

LOS ANGELES.—A few miles east of the southern tip of the McKittrick field in Kern County and about 1 mile outside Naval Petroleum Reserve No. 1, McDonald, Burns & Norris have completed what might prove to be a gas-cap well in a new field in 36-30s-22e. This new wildcat completion is 1 Flickinger which was brought in flowing 4,859,000 cu. ft. of wet gas and between 10 and 15 bbl. of 52-gravity condensate through an 18/64-in. bean from 5,147 ft. with 7-in. casing hung at 5,055 ft. Through a 29/64-in. bean the well flowed 12,206,000 cu. ft. of gas daily and when bean was enlarged to 50/64-in. the well flowed 16,030,000 cu. ft. Shut-in pressure at present is 1,650 lb. Top of the Etchegoin was cored at 2,860 ft. and the Olig gas sand was found at 4,812 ft. In the same section, Union Oil Co. of California drilled a well to a depth of 4,563 ft. where the test was dry.

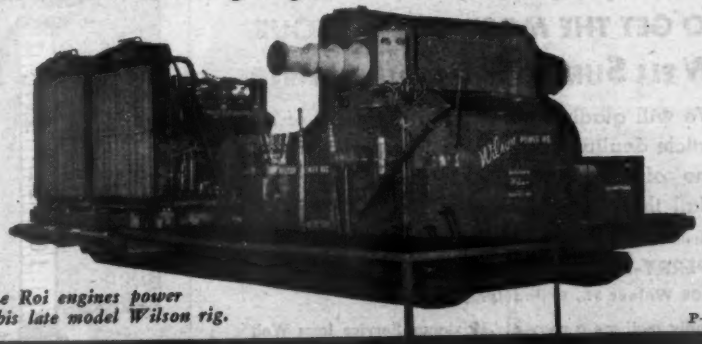
Standard Oil Co. of California extended the limits of the Seal Beach field in Orange County several years ago by completing 29 San Gabriel flowing 325 bbl. of 26.7°-gravity oil and 550,000 cu. ft. of gas daily from 4,975 ft. This is the first Selover zone well to be finished as a commercial producer north of the Seal Beach fault in the northwest end of the Seal Beach field. Recently the lower zone was extended north of this fault by Shell Oil Co., Inc., and at present several lower zone wells are headed down to the deeper sand. Continental Oil Co. has about six probable locations ready for drilling. Interest was centered in this area a few months ago by the Hellman estate interests which have succeeded in completing several excellent flowing wells on the Hellman property.

Bender Drilling Co. is putting the finishing touches on what appears to be a new discovery a few miles west of the center of the Round Mountain field in Kern County in Section 14-28s-28e. On a formation test this well showed a 700-ft. rise of oil during a water shut-off test. Bottom of the hole is 2,660 ft. in oil sand with 6⅝-in. casing cemented at 2,635 ft. The oil sand is the Vedder of Miocene age and the structure is a fault trap, both common characteristics of this general region. At the southeast end of the Round Mountain field, Tide Water Associated Oil Co. is coring in 1-27 Olcese in Section 27-28s-29e and should be right on top of the Vedder zone. At Gosford, Tide Water has cemented 5½-in. casing at 7,840 ft. in its second well in this region. This well has cored oil sand at 7,861-7,945 ft., although not all of the 81 ft. is oil sand.

Drilling operations continue to increase in the Buena Vista Hills field as well as at Elk Hills. During September, nine new wells were completed at Buena Vista Hills and 16 new wells were put on production at Elk Hills. There appears to be a general increase in development work all through the San Joaquin Valley and every drilling rig is in operation. This increased drilling is being reflected in state production as 33,667 bbl. of new production was added in September from 165 completions. October has started off at about the same rate and, with more leeway to

You can depend on Le Roi engines to power your drilling rigs efficiently and economically. More than a quarter century of specialized experience has given Le Roi engineers the "know how" that is demonstrated by the superior performance of Le Roi engines on one tough job after another. Le Roi engines give you steady, trouble-free service, with low maintenance cost—flashing response, to pull you safely through the pinches — and economy in operation. Le Roi engines are available in a complete range of sizes up to 400 H.P. Use gasoline, natural gas, or butane.

Write for descriptive bulletins.



Le Roi engines power this late model Wilson rig.

P-34

Le Roi Company

1750 South 68th Street • Milwaukee 14, Wisconsin

Branch and warehouse: Tulsa, Oklahoma . . . *Branch office:* Birmingham, Alabama . . . *Distributors* . . . Western Machinery Co., St. Louis, Mo., Centralia, Ill. . . . General Machine & Supply Co., Wichita Falls, Odessa, Texas . . . Southern Engine & Pump Company, Houston, Dallas, Kilgore, Alice, San Antonio, Texas . . . Le Roi Rix Machinery Co., Los Angeles, Calif.

LE ROI MILWAUKEE

The POWER BEHIND OIL PRODUCTION

MINNEAPOLIS-MOLINE
TWIN CITY OIL FIELD ENGINES

MM oil field engines have all the rugged, efficient, low cost operating and long life service features that are so vital to efficient oil production. Engines that will operate 24 hours per day year in and year out with the very minimum of servicing. Yet when service is necessary they are designed so that all parts are readily accessible. Their compact, heavy duty, extra strength construction assures *Power* that retains its performance standard after long years of gruelling service—*Power* that will work for *you* at low first cost and low upkeep with the added economy of either natural gas or liquid fuels. Built-in force-feed lubrication, valve-in-head design, controlled cooling for gas economy, unit construction, including cylinder blocks removable independently from crankcase and heads, are among the features exclusive with MM. MM oil field Engines are built in 8 models:

165-4A, 3⅝x4, 4 cyl. CUA, 4¼x5, 6 cyl.
206-4A, 3⅝x5, 4 cyl. HUA, 4⅝x6, 6 cyl.
KUA, 4¼x5, 4 cyl. MEU, 8x9, 4 cyl.
LUA, 4⅝x6, 4 cyl. NEU, 8x9, 6 cyl.

Send for complete bulletins on MM oil field engine performance.

SHRIMPTON EQUIPMENT COMPANY
Distributors

562 Subway Terminal Building
Los Angeles 13, California

545 Mellie Esperson Building
Houston, Texas

415 Oklahoma Building
Tulsa, Oklahoma

MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA, U. S. A.

SPERRY-SUN

Do You Know How

TO GET THE MOST OUT OF YOUR WELL SURVEYING EQUIPMENT?

We will gladly forward you a reprint of an article dealing with the subject, published in one of the well known trade magazines. Mail the coupon below.

SPERRY-SUN WELL SURVEYING CO.
1608 Walnut St., Philadelphia 3, Pa.

Kindly mail me a copy of "Maximum Service from Well Surveying Equipment."

Name_____
Position_____
Company_____
Address_____
O.G.

SPERRY-SUN WELL SURVEYING CO.
PHILADELPHIA, PA.

Easy-to-read, *raised* black graduations on crack-proof white surface... resist abrasion from oil, sand, scraping on the pipe pile, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

EST. 1867
KEUFFEL & ESSER CO.
NEW YORK - HOBOKEN, N. J.

produce, operators will be able to maintain production instead of having to balance production with allowables.

CALIFORNIA WILDCAT COMPLETIONS

McKittrick Front outpost well, Kern County: McDonald, Burns & Norris 1 Flickinger, 36-30s-22e, flowed 16,030,000 cu. ft. gas, spray of condensate, 50/64-in. bean, shut-in pressure 1,650 lb., Etchegoin 2,860 ft., Olig gas sand 4,812 ft., TD 5,147 ft.

Turnbull Canon outpost well, Los Angeles County: Fowler Drilling Co. 1 Saunders, 13-2s-11w, in hard gray sand, only minor showings logged, TD 4,030 ft.

SOUTH LOUISIANA

Barnsdall Discovery Flows Potential of 794 Bbl. Daily

NEW ORLEANS.—Barnsdall Oil Co. 1 P. & M. D. Miller, discovery well at West Tepetate, Jefferson Davis Parish, flowed a potential of 793.80 bbl. daily on ¼-in. choke from perforations 8,516-28 ft., total depth 10,032 ft. Tubing pressure was 1,300 lb., casing sealed, gravity 34.8°, no water.

Gulf Refining Co. 10 State-West Bay PP, Section 35-22s-30e, Plaquemines Parish, testing in a new deeper sand for the field in perforations 10,888.92 ft., flowed at the rate of 390 bbl. daily on 5/32-in. choke, gravity 30°, gas-oil ratio 6,335 to 1, tubing pressure 5,400 lb., killed and squeezed to cut down on the excessive pressure. Total depth is 11,200 ft., with 5½-in. casing set at 10,976 ft.

Continental Oil Co. 1 King Corp., discovery well of the Bayou Serpent field in Jefferson Davis Parish, showed for an excellent oil well on Conservation Department potential. It flowed 178 bbl. in 24 hours through 6/64-in. choke, tubing pressure 1,025 lb., casing sealed, gas-oil ratio 672 to 1. Gravity 35.7°, no water. Completion is in the Ortego sand in perforations 7,135-45 ft. Total depth is 9,302 ft. with 7-in. set to 8,170 ft.

Continental 1 Glen Greathouse et al, Section 9-11s-8w, prospective discovery well at South Lake Charles prospect, Calcasieu Parish, is waiting on cement after squeezing perforations 10,904-14 ft., where it had failed to get a test. Top of cement is 10,895 ft. Total depth 11,019 ft. with 7-in. casing set on bottom.

Continental 32 Prairie Land & Cattle Co., East Moss Lake area, Calcasieu Parish, continues to test in perforations at 10,414-418 ft. Latest test showed a flow of 195 bbl. a day, 20 hours on 12/64-in. choke and 4 hours on 6/64-in. choke, gravity 51°, tubing pressure 5,700 lb., total depth 10,500 ft.

Humble Oil & Refining Co. 2-B Petit Anse Co. at Avery Island, Iberia Parish, total depth 9,629 ft. in salt, took sidewall samples, reporting sand showing oil at 9,125 ft.

George Echols 5 Realty Operators, Vacherie field in St. James Parish, on west side of the Mississippi River, was completed in perforations at 5,619-25 ft. It made a Conservation Department potential of 146.5 bbl. daily on ½-in. choke. Total depth 6,566 ft., with 5½-in. casing set to 5,790 ft.

LOUISIANA GULF COAST WILDCAT COMPLETION

Jefferson Davis Parish: Barnsdall Oil Co. 1 P. & M. D. Miller, discovery, West Tepetate area, Sec. 36-7s-3w, TD 10,032 ft., perforations 48 holes from 8,516-28 ft., PT 793.80 bbl. day ¼-in. choke, 852,000 cu. ft. gas day, tubing pressure 1,300 lb., casing sealed, gravity 34.8, no water.

KANSAS

Northeast Stafford Co. Gets New Pool

STANOLIND OIL & GAS CO. 1 Voight, CSL NE SE 11-22s-12w, Stafford County wildcat, between South Sittner and Heyen pools, is producing from the Arbuckle and has been assigned a physical potential of 145 bbl. This well pumped 45 bbl. oil and 1⅓ bbl. water in 10 hours through 2-in. tubing, after acidizing with 500 gal. Tops were conglomerate —1,679 ft., Simpson —1,719 ft., and Arbuckle —1,783 ft.

North of the Hall-Gurney pool, in Russell County, El Dorado Refining Co. 1 Reine, SE NE 19-14s-13w, has made a strike which promises to be a light producer. When the Arbuckle, topped at 3,191 ft., was penetrated, hole filled with 1,720 ft. of oil with a small amount of water showing.

Superior Oil Co. 1 Patterson, SE SW 16-28s-13w, Pratt County, 2 miles south of the city of Pratt, may be opening a new gas pool. Several zones are being tested. A good flow of gas has been logged, and operators are now testing a show of oil at 3,112-23 ft.

First reports indicate a normal continuation of drilling, with 41 new locations, of which 13 are wildcats. New wildcats are well spread, with McPherson and Sedgwick counties having two apiece, and one each reported from Barton, Comanche,

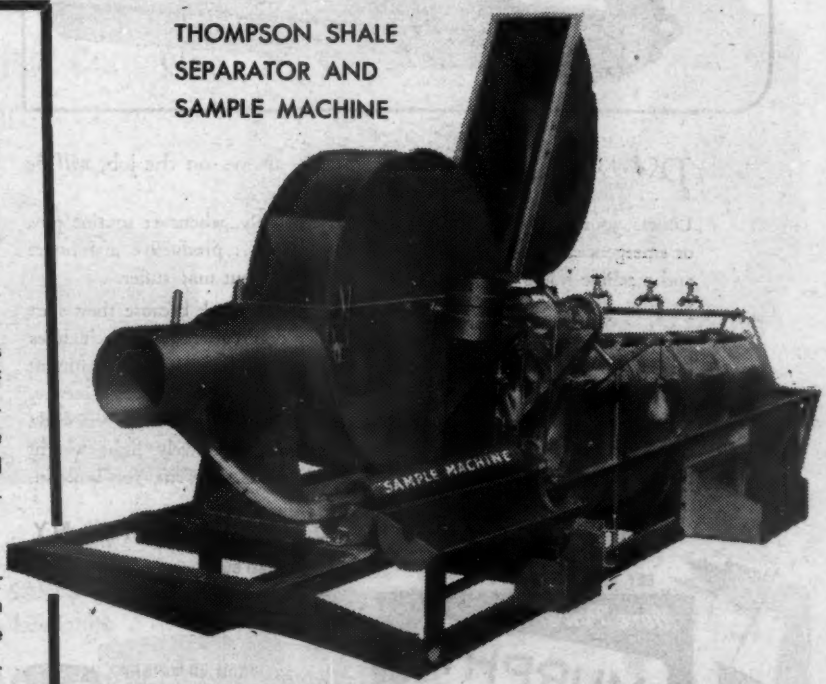
KEEPS MUD *Thoroughly* CLEAN!

THE THOMPSON SHALE SEPARATOR — which operates entirely from the flow of mud — is the most economical method of thoroughly reconditioning drilling mud. Eliminates destructive abrasives from drilling mud, and protects and saves drilling equipment and materials.

THE SAMPLE MACHINE — standard equipment on all Thompson Shale Separators — provides true samples of foot by foot cuttings.

Sizes to meet any drilling requirement.

THOMPSON SHALE SEPARATOR AND SAMPLE MACHINE



THOMPSON TOOL CO.

IOWA PARK, TEXAS, U.S.A.

Ellis, Ford, Harper, Kiowa, Pratt, Rice and Stafford counties.

KANSAS WILDCAT COMPLETIONS

Barton County: Phil Han et al 1 Lewis, SE SE SE 3-16s-13w, dry, TD 3,440 ft., Arbuckle 3,400 ft.

Mouser Drilling 1 Kath, SE NE SE 1-19s-13w, dry, TD 3,414 ft., Arbuckle 3,382 ft.

Vickers 1 Krkoska, NE NE NE 33-20s-12w, pumped 69 bbl. oil and 25 per cent water after acidizing with 3,000 gal., TD 3,428 ft., Arbuckle 3,410 ft.

Barber County: Gulf 1 Bob, SE SE NE 28-30s-12w, dry, TD 4,645 ft., Simpson 4,527 ft., Arbuckle 4,640 ft.

Butler County: Wood River 1 Lucas, NE SW NW 2-27s-7e, dry, TD 3,215 ft., Mississippi lime 2,748 ft.

Ben Grallup et al 1 Kenyon, Lot 26, 19-24s-8e, dry, TD 2,760 ft., Mississippi lime 2,744 ft.

Decatur County: Sinclair Prairie 1 Bremer, NW NW SE 28-4s-28w, dry, TD 4,656 ft., Arbuckle 4,422 ft.

Sterling Drilling 1 Randall, W/2 NE SW 11-5s-27w, dry, TD 4,144 ft., Arbuckle 4,044 ft., Granite 4,132 ft.

Ellis County: El Dorado Refining 1 Gunther, NE NE NW 9-11s-19w, dry, TD 3,707 ft., Arbuckle 3,683 ft.

Sunray 1 Hauschild, NW NW SW 17-15s-19w, dry, TD 3,621 ft., Reagan 3,608 ft.

Greenwood County: Ward McGinnis 1 Leedy, SW SW NW 31-25s-12e, dry, TD 2,096 ft., Arbuckle 2,089 ft.

Leavenworth County: Dan McLaughlin 1 Seufert, SW SW NE 31-10s-22e, dry, TD 1,276 ft., Mississippi lime 1,136 ft.

McPherson County: Bay & Westgate Greenland 1 Meyers, NE NE NW 7-19s-1w, estimated 100 bbl. per day from pay zone 2,950-52 ft., TD 3,492 ft., Mississippi lime 2,928 ft.

Rice County: Wolf Creek et al 1 Kratzer, SE SE NE 22-19s-7w, dry, TD 3,677 ft., Arbuckle 3,664 ft.

Rush County: Cities Service 1 Urban, SW SW NW 10-16s-17w, dry, TD 3,630 ft., Arbuckle 3,597 ft.

Sedgwick County: Nelson Drilling et al 1 Brears, NE SW SE 5-26s-2e, dry, TD 3,007 ft., Mississippi lime 2,974 ft.

Stanolind 1 Marx, NW NE NW 10-27s-4w, dry, TD 4,310 ft., Arbuckle 4,297 ft.

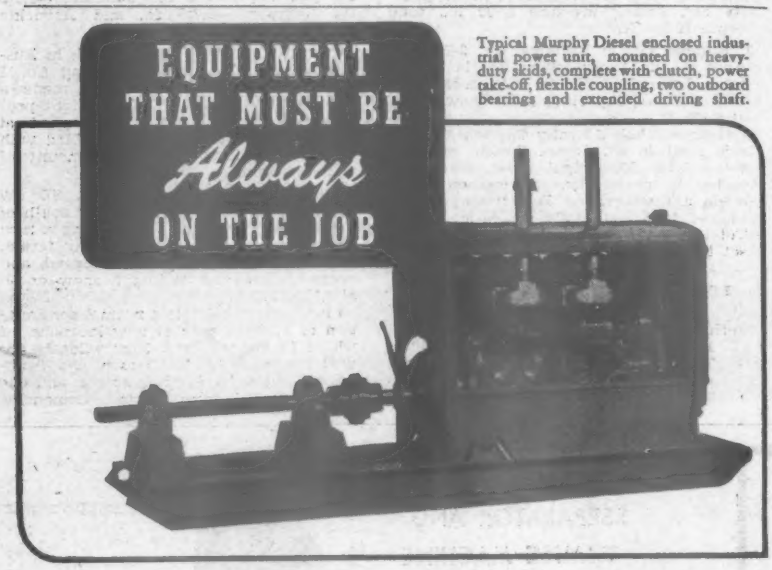
Stafford County: H. A. Hershfield 1 Sittner, NW NW SW 4-22s-12w, dry, TD 3,685 ft., Arbuckle 3,667 ft.

Trego County: Sinclair Prairie 1 Parks, SE SE NW 18-14s-24w, dry, TD 4,518 ft., Arbuckle 4,500 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—Charles Miller 5 McLeod, E½ NE NE 5-10s-20e, in the McLouth pool of Jefferson County, Kansas, was completed at 1,619 ft., good for 40 bbl. Mississippi lime was topped at 1,466 ft.

Cities Service Oil Co. has completed its 1944 development program in the Tarkio pool of Atchison County, Missouri, with the completion of 6 Watkins, SW SE NW 32-65n-39w. Bartlesville sand was topped at 1,378 ft., and after a 17-qt. shot, the hole filled with oil.



Typical Murphy Diesel enclosed industrial power unit, mounted on heavy-duty skids, complete with clutch, power take-off, flexible coupling, two outboard bearings and extended driving shaft.

POWER EQUIPMENT that *must* be always on the job, *will be* . . . if powered with Murphy Diesels.

Unless your power is ready to work immediately, whenever routine jobs or emergencies require, serious losses may pile up . . . productive man-hours and machine hours may be wasted . . . barrel output may suffer.

Murphy Diesels are always ready for immediate work because they start easily . . . they need no long coaxing . . . they don't disrupt work schedules by difficult, slow starting. They are rugged . . . can take heavy intermittent peak loads or can put out power steadily for long continuous service. Economical to operate, easy to keep at peak efficiency, and need very little time-out for maintenance. Compactness and relatively light weight permit adaptability to all types of power needs. Write for bulletin.

MURPHY DIESEL COMPANY

5305 West Burnham Street
Milwaukee 14, Wisconsin

OKLAHOMA

Pipe Line Station Fire Will Cut W. Edmond Production

DESTRUCTION of the Banks pump station of the Cimmaron Valley Pipe Line Co., main trunk line outlet of the West Edmond field, on Sunday afternoon, will force pinching back production to varying degrees for about a week, pending temporary replacement of pumping equipment. Pipe-line runs averaged 31,600 bbl. daily from 174 connected wells, with a flock of week end completions bringing the total number of producing wells close to the 200 mark. Mud has been delaying construction work and laying connections.

Magnolia Petroleum Co. 1 Talbot, NW NW 28-13n-4w, which extended the field a mile south, flowed 103 bbl. per hour through ½-in. tubing choke, with gas estimated at 3,100,000 cu. ft. per day. Casing pressure was 425 lb., and tubing pressure 1,155 lb. The Talbot well is almost midway between an old dry hole in SE NW 27-13n-4w and a recent dry hole in SW SE 19-13n-4w, indicating that the field will be narrow in width at this point.

Cities Service Oil Co. 1 Gaffney, SE NE 29-15n-4w, on northeast edge of the field, after failing in the Hunton, looks like a big gasser in the Bartlesville sand.

Oklahoma Natural Gas Co. 1 Chandler Unit, NE SE 27-5n-8w, on west side of the Chickasha gas field, caught fire while backing up to test the upper gas zones when the crew opened it up to blow it clean before attempting a dual completion.

OKLAHOMA WILDCAT COMPLETIONS

Caddo County: Amerada 1 No-Hol-Co, SW SE SE 2-5n-10w, dry, TD 9,793 ft., Deese 8,855 ft., second Deese 9,610 ft.

Cotton County: Carter 1 Parrish, SW SW 1-2s-12w, dry, TD 2,746 ft., Pennsylvanian lime 2,582 ft.

Garvin County: E. J. Kubat 1 Dickson, NE SW SE 9-3n-1e, dry, TD 3,610 ft.

Jefferson County: Raizen & Raizen 1 Little, NW SE SW SE 17-3s-5w, dry, TD 1,475 ft.

Lincoln County: E. S. Adkins 1 Nonnamaker, SW SW NE 9-15n-6e, dry, TD 4,172 ft., Wilcox 4,118 ft., second Wilcox 4,152 ft.

Logan County: Kerlyn & Phillips 1 Green, SE NW 36-18n-4w, discovery, flowed

PUMP WATER
THE PEERLESS WAY

PEERLESS-DESIGNED
PEERLESS-ENGINEERED
PEERLESS-INSTALLED
PEERLESS-SERVICED

Tailored to your needs

10 to 220,000 G.P.M.

PEERLESS PUMP DIVISION—*Food Machinery Corporation*
1250 Camden Ave., S.W. Canton 6, O.; 301 W. Ave. 26, Los Angeles 31, Cal.
OTHER FACTORIES: Fresno 16, San Jose 5, California

PEERLESS
Deep Well Pumps

Manufacturers of Oil Field Cordage for Many Years

Distributors stocks at principal points

Write us for booklet "CARE SAVES ROPE" and W.P.B. Conservation Literature

ST. LOUIS CORDAGE MILLS
11th & Lafayette Streets, St. Louis, Mo.

"YOU CAN'T BUY MORE DEPENDABLE BRANDS"

Cast Steel
GATE VALVES

The dense-grain structure of Ludlow Steel Valves, cast in our own foundries, has been developed through years of metallurgical research. Combined in Ludlow design to meet widely varying temperatures with positive closure, and long-lasting dependability.

More than a million Ludlow Cast Steel and Cast Iron Valves are in use throughout the petroleum industry. Catalog sent on request. O-4

Ludlow Fig. 1571. Cast Steel, Gate Valve. Bronze mounted, with flanged ends. OS&Y. Steam working pressure, 150 lbs. at 500° F.

The **LUDLOW VALVE** SINCE 1866 MFG·CO·INC· TROY·N·Y·

PAGE FENCE - Since 1883

• AMERICA'S FIRST WIRE FENCE •

Maybe You CAN Have a Fence

● If you have proper priorities you need not continue to gamble on the safety of lives and security of property. You can have the needed protection of a sturdy Page Chain Link Fence. Or if you now have this safeguard, have it inspected and reconditioned if necessary. Consult the long-experienced Page Fence firm on all fence needs. There's no obligation for cost estimates. Write for FENCE FACTS and we will send name of nearest Association member. PAGE FENCE ASSOCIATION, Headquarters: Monessen, Pennsylvania.

PRODUCT OF PAGE STEEL & WIRE DIVISION • AMERICAN CHAIN & CABLE COMPANY, INC., BRIDGEPORT, CONN.

Secondary Recovery Provides MORE OIL FOR WAR

Complete practical experienced engineering service, including:

Preliminary Surveys	Water-Treating Plants
Gas Measurements	Compressor Plants
Bottom-Hole Pressure	Estimate of Results
Coring Equipment	Supervision
Core Analysis	Installation
	Operation

We invite your inquiries and would like to cite you references and show you actual performance records.

PETROLEUM ENGINEER
JO H CABLE
WICHITA FALLS TEXAS

CYLINDERS are separate from CRANKCASE

ON ALL WISCONSIN 4-Cylinder V-Type Air-Cooled ENGINES

The cylinders on all V-type Wisconsin Air-Cooled Engines are cast in pairs, separate from the crankcase, for quick, economical servicing when required. In case a cylinder is accidentally scored beyond the possibility of reboring, it is only necessary to replace a relatively inexpensive pair of cylinders instead of an entire engine block. The picture shows the Model VE-4 Wisconsin Engine, with protective shrouding removed, illustrating method of attaching cylinders.

Most H.P. per pound

WISCONSIN MOTOR Corporation
MILWAUKEE 14 WISCONSIN U.S.A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO. 510 ATLAS BLDG., TULSA, OKLA. 11 & M BLDG., HOUSTON, TEXAS
OIL FIELD DISTRIBUTOR FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS

CURTIN CENTRIFUGES

GIVE YOU QUICK, ACCURATE RESULTS WITH LESS EFFORT . . . AT LESS COST

Simple in design, ruggedly built for heavy duty service. Gear ratio and throw of crank produce required speed with no strain. Heads and cranks of 100 CC and 15 CC machines are interchangeable. Meets *A.S.T.M. Standard Method D-96* and *A.P.I. Code No. 25* requirements. Ask for full details.

W·H·CURTIN & CO. Inc.
HOUSTON TEXAS USA

192 bbl. through 21/64-in. choke, from pay zone 4,806-33 ft., TD 4,855 ft., Layton 4,806 ft.

Osage County: Mealy-Wolf & Devonian No. 1, NW SW NE 32-23n-6e, dry, TD 3,220 ft., Wilcox 3,156 ft., second Wilcox 3,202 ft.

Pawnee County: Deep Rock 1 Dawes, SW NW SE 32-22n-7e, dry, TD 3,092 ft., Arbuckle 2,980 ft.

N. CENTRAL TEXAS

Strawn to Be Tested in Grayson County Wildcat

WICHITA FALLS.—Pure Oil Co. 1 Quinton Little, Jr., projected 11,000-ft. wildcat southwest of Gordonville in Grayson County, was preparing last week end to make a drill-stem test of shows found in Strawn sand. It topped sand at 7,445 ft., logged dry sand 7,445-48 ft., tight sand with stain and odor 7,448-58 ft., dry sand and cherty conglomerate 7,458-60 ft., and sand with fair porosity at intervals with some saturation and stain from 7,460-68 ft. Operators planned to drill to 7,475 ft. and then make the drill-stem test. Pure's test is about 3 miles from R. W. Talbot et al 1 Jewell, deep test which at one time looked like it would make about 50 bbl. per day from Strawn sand. Inconclusive efforts to produce it were abandoned about 2 years ago, but the hole is still standing unplugged.

Wilbarger County's new discovery well, Fain-McGaha Oil Corp. 1 Martin, 3 miles west of Fargo field, perforated casing at 4,750 to 4,810 ft. with 40 shots, opposite Palo Pinto lime pay, filled up and flowed for 6½ hours, with no estimate on production.

Continental Oil Co. 1 Wm. Risch, wildcat 3 miles east of Joplin in Jack County, after going to 6,415 ft. in Ellenburger lime, plugged back and perforated casing at 4,947-51 ft., in the Marble Falls zone. Fluid rose to 600 ft. of surface in 6 hours, then the well kicked off and flowed 30 bbl. of oil and 1 bbl. of water load in 1 hour, with 2,000,000 cu. ft. of gas daily, after which it was shut in.

In southwestern Montague County, Continental Oil Co. 1 McNutt, southwest of Bowie, total depth 7,299 ft., perforated casing at 6,715-30 ft. in the Viola lime zone, swabbed in and flowed 29 bbl. of oil in 1 hour, then died. Operators prepared to run tubing.

S. D. Johnson 1 J. S. Gatewood, shallow wildcat 4 miles southeast of Muenster, Cook County, filled up 1,200 ft. with oil in 16 hours, then pumped 35 bbl. of oil in 5 hours before pumping rig had to be shut down for repairs. It is producing from sand between 1,568-81 ft., total depth. In northern Cooke County, The Texas Co. 1 Rasure, Sivels Bend area, squeezed off perforations at 6,755-63 ft. and was drilling out cement with plans to reperforate and test further.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Clay County: J. W. Hastings and C. D. Knight 1 Paul Bilbrey, Lot 16, Pratt's Pasture subd., 11 mi. W Petrolia, dry, TD 1,209 ft.

Shappell Oil Co. 1 Zelma Roberts, Blk. 74, Parker CSL, A-374, 4 mi. S and 3 mi. E Petrolia, dry, TD 1,987 ft.

Shell Oil Co. 1-A L. P. Hapgood, James Walker Sur., A-700, 7 mi. S and 5 mi. E Henrietta, elev. 897 ft., Barnett 6,902 ft., Viola 6,470 ft., Simpson 6,483 ft., dry, TD 6,500 ft.

Cooke County: Kadane-Griffith Oil Co. 1 S. B. Hopkins, Sec. 18, BBB&C Sur., A-150, 2½ mi. E Freemond, elev. 1,028 ft., I.P. 846 bbl. through ½-in. choke, gravity 39.4, TD 2,983 ft.

Phillips Petroleum Co. 1 J. M. Weinzapfel, A. Emmanuel Sur., A-1,197, 2 mi. W and 4 mi. S Muenster, elev. 1,064 ft., dry, TD 2,737 ft.

Jack County: O. J. Perrin 1 J. L. King, J. S. Henderson Sur., A-1,619, 3½ mi. S Antelope, elev. 1,133 ft., I.P. 10 bbl. day, TD 4,928 ft.

Throckmorton County: Panhandle Ref. Co. 1 W. B. Ewalt, Sec. 2170, TE&L Sur., 3 mi. S and W Elbert, elev. 1,256 ft., I.P. 960 bbl. day, gravity 40, gas-oil ratio 800 to 1, TD 5,034 ft.

Wichita County: F. H. Schram et al 2 G. T. West, Blk. 62, KWVFL Sur., 3 mi. W and 1 mi. N Holliday, dry, TD 812 ft.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Eastland County: C. D. Lane 1 A. M. Butler, Sec. 1, CTRR Sur., 2 mi. SW Rising Star, elev. 1,680 ft., dry, TD 1,102 ft.

Fisher County: Northern Ordnance, Inc., 1 B. Yantis, Sec. 182, Blk. 2, H&TC Sur., 6 mi. NE Rotan, elev. 1,886 ft., dry, TD 6,010 ft.

Jones County: Hunt Oil Co. 1 Minnie Rinnels, BBB&C Sur., 2 mi. N Avoca, elev. 1,517 ft., Palo Pinto 3,320 ft., dry, TD 3,325 ft.

Stephens County: Phillips Petroleum Co. 1 North Wild, Sec. 58, Blind Asylum Land, 3 mi. SW Eolian, elev. 1,373 ft., Caddo 3,495 ft., Barnett 4,180 ft., Ellenburger 4,374 ft., I.P. 594 bbl. day through 32/64-in. choke on 2-in. tubing.

Top Cylinder Lubrication

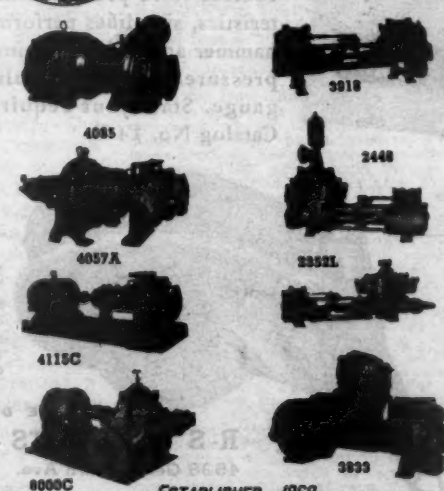
FOR OIL FIELD ENGINES!

Wherever gas fuel engines are in service in the oil fields, you'll find Marvel Mystery Oil and the Marvel Inverse Oiler in service. For, Marvel Mystery Oil heads off the gumming that causes valve and ring sticking and when it is proportioned to the engine by the ingenious Marvel Inverse Oiler it assures vital top cylinder lubrication.

In high heat engine combustion areas, where ordinary lubricants break down, Marvel Mystery Oil sustains its remarkable efficiency. Ask us to show you how this specially compounded, detergent, high film strength lubricant combats the motor killing effects of the residues of fuel combustion. Used in connection with the Marvel Inverse Oiler, it provides an auxiliary system of top-cylinder lubrication that protects vital parts, extends motor life and improves performance. Ask for the facts. Emerol Manufacturing Co., 242 W. 69th St., New York 23, N. Y.

use the MARVEL INVERSE OILER WITH MARVEL MYSTERY OIL

PUMPS
CENTRIFUGAL
RECIPROCATING



ESTABLISHED 1869
DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W TENTH ST.

Maintain a Constant

UPSTREAM or DOWNSTREAM PRESSURE

No. 501. 125-pound American Standard R-S Butterfly Valve. Declutching unit (patent applied for) permits operation of the valve with either the hand wheel or the positioner cylinder.

R-S

15 to 900 psi
for air, gas, steam, liquids and semi-solids

The R-S Butterfly Valve is controlled automatically by the line pressure and is actuated by the oil or hydraulic positioner cylinder attached to the valve. If the line pressure decreases, the valve vane slowly closes until the predetermined line pressure has been reached, at which time the valve vane automatically reopens.

The dotted lines indicate the piping necessary to maintain a constant upstream pressure.

The use of an R-S Butterfly Valve as a main control valve provides unexcelled flow characteristics, simplifies performance, prevents water hammer and reduces maintenance. Operates for pressures between absolute and 900 pounds gauge. State your requirements and ask for Catalog No. 14-B.

No. 529. 30-inch R-S Butterfly Valve with extension shaft for high pressure drops and heavy duty service. Only four to six revolutions of the handwheel are necessary for wedge-type closure.

VALVE DIVISION
R-S PRODUCTS CORPORATION
4538 Germantown Ave. • Philadelphia 44, Pa.

R-S Streamlined BUTTERFLY VALVES

gas-oil ratio 555 to 1, gravity 43.4, TD 4,404 ft.

Talyor County: West Central Drilling Co. 1 Hollis McCoy, J. A. Nabors Sur., No. 8, 5 mi. NE Merkel, elev. 1,812 ft., Gunsight 2,614-16 ft., pumped 117 bbl. day through 2-in. tubing, gravity 44. TD 2,616 ft.

MISSISSIPPI

Washington County, Ala., Has 3 Wildcats Drilling

JACKSON. — Operators are watching southwestern Alabama with increased interest as three wildcat tests are drilling in one county, Washington, and reports circulate of a possible fourth test in the same area. The Texas Co. 1 Stallsworth Naval Stores, SW NW 10-3n-3w, is drilling at 6,200 ft.; Humble Oil & Refining Co. 1 Williams, SW NW 20-6n-4w, is drilling at 6,160 ft., and A. C. Derr et al 1 Hobson, SW NE 9-8n-2w, has set surface pipe at 180 ft., and is preparing to drill ahead. It is reported that Derr and associates are also planning another test in the same general area.

Republic Oil Co. has started the construction of a causeway out into Barnes Sound, off the southeast corner of Dade County, Florida, preparatory to starting its first deep test on the Blanchard Concession. Wm. G. Blanchard et al 1 Everglades, in 31-53-35, 40 miles west of Miami, is coring at 10,284 ft. in Lower Cretaceous limestone.

Gulf Refining Co. 1 Cooper, NE NW 7-1n-16w, which passed up probable commercial production in the Upper Tuscaloosa between 7,736-7,834 ft., to test the Massive sand, made a 16-minute drill-stem test at 8,687-99 ft., and recovered 3,100 ft. of 34° gravity oil. Drilling will continue to the Massive, which is expected at about 8,900 ft. Tops reported to date are Eutaw —7,201 ft., Tuscaloosa —7,279 ft., Marine Tuscaloosa —7,834 ft., base black shale —8,206 ft. Elevation of 222 ft. makes latest drill-stem test —8,465-77 ft.

LA.-ARK.

Bossier Parish Test Finds Condensate in Bodcaw

SHREVEPORT.—Barnsdall and Sohio Petroleum Co. 1 Hanks, SW NE 7-20n-12w, a wildcat test in Bossier Parish, 14 miles west of the Cotton Valley field, has opened a new condensate field, flowing 125 bbl. per day of 58.4°-gravity condensate through a ¼-in. tubing choke with gas-oil ratio of 29,000 cu. ft. per bbl., from the Bodcaw sand of the Cotton Valley formation at 8,114-48 ft. There was no water in the Bodcaw and casing was perforated to take in the entire sand section.

The electric log survey indicates the "D" sand of the Cotton Valley may be as good as the Bodcaw, and before completion, operator plans to set a bridge plug above the Bodcaw and test the "D" sand at 8,003-35 ft. Barnsdall and Sohio have a 10,000-acre block in the vicinity of the well.

ARKANSAS WILDCAT COMPLETIONS

Nevada County: G. H. Vaughn, Jr. 1 Nixon, SW NE SE 6-15s-20w, dry, TD 4,215 ft.

Union County: Kerlyn Oil 1 Saw, NW SW NE 17-17s-11w, dry, TD 5,560 ft.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended October 14, 1944					Cumulative total, 1944				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	1	1	2	2	0	17	57	76
Indiana	0	0	0	1	1	4	0	0	20	24
Illinois	1	0	0	7	8	27	0	0	247	274
Kentucky	0	0	0	1	1	13	0	0	71	84
Michigan	0	0	1	4	5	12	0	3	192	207
Kansas	2	0	0	17	19	43	0	9	347	399
Neb., Mo., Iowa	0	0	0	0	0	1	0	0	13	14
Oklahoma	1	0	0	7	8	56	0	20	219	295
Texas:										
North Central	3	0	0	5	8	53	0	1	248	302
West	3	0	0	3	6	37	0	3	138	178
Panhandle	0	0	0	0	0	0	0	2	8	10
Eastern	0	0	2	4	6	5	0	3	101	109
Gulf Coast	1	0	0	2	3	30	12	13	188	243
Southwest	0	0	0	3	3	19	4	14	190	227
Total Texas	7	0	2	17	26	144	16	36	873	1,069
Louisiana:										
Northern	0	0	0	1	1	4	0	1	46	51
Southern	1	0	0	0	1	7	6	0	38	51
Total Louisiana	1	0	0	1	2	11	6	1	84	102
Arkansas	0	0	0	2	2	2	1	0	47	50
Mississippi	0	0	0	0	0	3	0	0	54	57
Ala., Ga., Florida	0	0	0	2	2	2	0	0	24	26
Montana	0	0	0	1	1	3	0	4	37	44
Wyoming	0	0	0	0	0	14	0	1	18	33
Colorado-Utah	0	0	0	0	0	3	0	1	24	28
New Mexico	0	0	0	0	0	6	0	3	47	56
California	0	0	1	1	2	6	0	8	149	163
Total United States	12	0	5	62	79	352	23	103	2,523	3,001
Total previous week	10	0	2	72	84					

McLaughlin Made Counsel For District 5, PAW

LOS ANGELES. — Robb S. McLaughlin, of Glendale, Calif., has been named district counsel for District 5, Petroleum Administration for War. He succeeds Clyde Thomas. District 5 comprises Washington, Oregon, California, Nevada and Arizona.

McLaughlin was educated at Northwestern University. He came to Los Angeles in 1926 to practice law and in 1928 became a member of the district attorney's staff, resigning the next year to enter the city attorney's office. In 1934 he was appointed a deputy to handle the work of the Division of Oil and Gas, Department of Natural Resources, and of the state Lands Commission in southern California.

Producing Fields and Other Data Presented by Map

In addition to oil, gas and condensate fields of East Texas, South Arkansas, North Louisiana, Mississippi, and West Alabama, a new map of these areas announced by Mid-Continent Map Co., Box 6277, Houston, Tex., gives also the counties in which the fields are located; discovery date; gravity of the oil produced; name, age and depth of producing formations, and the size and ownership of oil and gas pipe lines. The map, which shows the producing fields in contrasting colors, is made in two sizes, 42 by 70 and 28 by 46 in. It was designed by Alec M. Crowell, of El Dorado, Ark., and has been copyrighted by him. Crowell also is director of the Arkansas Oil and Gas Association.

Spacing Regulations for 10 Arkansas Fields Relaxed

EL DORADO.—The 40-acre spacing requirement in 10 Arkansas oil fields has been relaxed by Petroleum Administration for War, 10-acre spacing being authorized for eight and 5-acre for two. Special provision was made for the Stephens-Smart field of Nevada, Columbia and Ouachita counties, where it was stated that shallow wells, now producing from the Blossom sand at approximately 2,150 ft., could be disregarded in the spacing of wells to the Travis Peak formation.

Granted 10-acre spacing are the Champagnolle, East El Dorado, South El Dorado, Hampton, Nick Springs, Smackover, Stephens-Smart and Wilmington fields. Granted 5-acre spacing are the Irma and Troy fields.

OPA Establishes Specific Ceilings on Pacific Coast

WASHINGTON. — Specific ceilings for petroleum products on the Pacific Coast at major levels of distribution other than retail sales at service stations have been established by the Office of Price Administration, effective October 19. The new ceilings will cause some changes in existing prices of a few sellers, OPA said, but the general level of prices will remain the same.

Bureau of Mines Starts Synthetic-Oil Survey

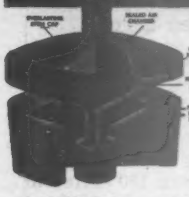
WASHINGTON.—Bureau of Mines engineers soon will start surveys of potential locations for synthetic liquid-fuel laboratories and demonstration plants. More than 150 different site proposals have been submitted to the bureau. Selection will be determined by such factors as the oil yields and processing properties of raw materials in the area, cost and topography of the land, proximity of towns or cities and housing facilities, nearness of essential services and the availability of transportation and utilities.

The laboratories and plants will form nucleus of the 5-year program of research and development to provide the "know how" for private commercial production of petroleum products from coal, lignite, oil shales, agricultural and forestry products.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the lands herein described within the Fulcher Basin gas field, N.M.P.M., New Mexico, are offered to the responsible qualified bidders of the highest cash amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. sec. 226) in the following parcels: T. 29 N., R. 12 W., Parcel No. 1, sec. 10, SE¼SW¼, 40 acres; Parcel No. 2, sec. 14, S½NE¼, S½, 400 acres; Parcel No. 3, sec. 15, SE¼ NE¼, SE¼, 200 acres; Parcel No. 4, sec. 15, SW¼NW¼, W½SW¼, 120 acres; Parcel No. 5, sec. 22, N½, N½S½, 480 acres. Sealed bids will be received in the office of the Commissioner of the General Land Office, Interior Department Building, Washington 25, D. C., up to 12 noon October 26, 1944. Bids must be submitted on each parcel separately but if two or more parcels are awarded to the same bidder they may be included in a single lease provided the aggregate acreage does not exceed 640 acres. Each bidder must submit a certified check or cash for one-fifth of the amount bid, payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the first year's rental at the rate of $1.00 per acre must be paid and a $5,000 corporate surety bond must be filed by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned. The envelopes should be plainly marked "Bid for Parcel No. , Fulcher Basin gas field, New Mexico. Not to be opened before noon October 26, 1944." No bids received after the hour and date fixed herein for submitting bids will be considered. The successful bidders will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin, and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 80, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

For Month In - Month Out Service
USE MacCLATCHIE
"AIRFLOTE"
MUD PUMP VALVES

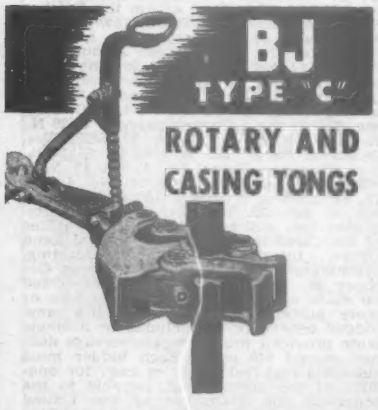


Because of the sealed-in air chamber that increases buoyancy . . . cuts liquid slippage . . . reduces impact . . . and gives more efficient valve action, MacClatchie "Airflote" Pump Valves insure superior performance and longer life under the toughest pumping conditions. Replaceable bodies, reversible inserts and everlasting stem caps give true MacClatchie economy.

The valve seats for "Airflotes" (interchangeable with MacClatchie "Streamlined" Valves) have 20% to 100% more striking surface than others, Plus patented cross-bar construction.

All MacClatchie Valves are guaranteed against cutting out the pump. See your nearest representative or write direct for details on this guarantee!

MacCLATCHIE
MANUFACTURING CO.
COMPTON, CALIFORNIA
Mid-Continent Distributor:
HAKE TOOL COMPANY, Houston, Texas
Rocky Mountain Representative:
MOUNTAIN SALES & SERVICE CO.,
Casper, Wyoming
Foreign:
GEORGE H. WOODS, 17 Battery Place,
New York, N. Y.



Designed for portable drilling rigs, workovers and for handling small sizes of drill pipe on the largest rigs, this tong has proven most popular and successful. All diameters from 2⅜" to 8⅝" are perfectly gripped by using proper size latch lug jaws. Tong can be equipped with either short or standard levers, dependent on derrick conditions. Hinge pin holes are flame hardened to insure long trouble-free life. This tong, like the BJ type "B," is designed to meet unusually tough service conditions.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York

Among the Drilling Contractors

Mercury Drilling Co. is below 2,500 ft. on a test it is drilling for its own account, the 1 Schepman, in C N½ SE SE 14-17s-10w, Ellsworth County, Kansas.

Newell & Chandler, Calgary, Alta, are moving heavy-duty rotary outfit which recently completed 2 Major in the Taber field, to Mid-Continent 1 Universal, LSD 12, 17-9-17w4, which will be deepened from 3,267 ft. to test the Devonian limestone, expected at 4,300-4,500 ft. The test is being jointly sponsored by Imperial Oil, Ltd., Standard Oil Co. of California, Mid-Continent Oil & Gas, Universal, and Alberta Petroleum Operators. Gas will be piped from the Major wells for fuel.

Can-Tex Drilling Co., Calgary, Alta, is moving outfit from the newly completed 8 Standard Oil Co. of California producer in the Steveville field to Foremost, in southern Alberta, to drill 1 Birdsholm-Province, in NE 33-4-11w4, also for California Standard. The latter well is the first test on a 22,000-acre permit area recently acquired.

Gene Reid Drilling Co. has been awarded contract to drill a test in the Cymric district of Kern County, California, for Victory Oil Co., which maintains offices in Long Beach.

Rowan & Nichols, of Fort Worth, have a 9,000-ft. contract on a deep wildcat in the center of an old gas pool in Beckham County, Oklahoma, which has been announced by Skelly Oil Co. and Tide Water Associated Oil Co. The test is their 1 Baldwin, in C NE NE 10-9n-25w. This is at the tip of the Erick gas-field structure and on a block of about 3,500 acres. Test will start as soon as tools can be moved in.

Big Chief Drilling Co. has the contract to drill a wildcat test for E. S. Adkins, of Tulsa, on the Nemaha trend 6 miles south of the Garber field and 6 miles south of Covington in Garfield County, Oklahoma. Location has been staked for the 1 State in NW NE NW 36-21n-4w, for a 2,500-ft. test.

Noble Drilling Co. has the contract for the Pure Oil Co. 1 Meyer, which was starting in SE SW NE 4-35s-6w, Harper County, Kansas. The objective is the Wilcox sand. The location is southeast of Anthony in an area where much core drilling and seismograph investigation has been conducted.

Campbell & Kuhn have drilling contract on Maguire Industries 1 Brundage, in SW NE NW 10-12-15w, 2½ miles southeast of production in the Fairport pool, Russell County, Kansas.

Stuart Godfrey has been awarded the drilling contract on the W. H. Clock 2 Ida Antonson, in SE SE SE 34-1n-16w, Allegan County, Michigan.

Perry, Busk & Ormiston, drilling contractors, will drill the Carl E. Grimes 3 John Pelon, in NE NE NE 3-4n-15w, Allegan County, Michigan.

Lupher Drilling Co. is the contractor on the Sinclair-Wyoming Oil Co. 1 Thad Vaughn, in NW NW SE 24-11n-16w, Oceana County, Michigan.

Union Drilling Co. has the contract to drill the H. E. Walton and William B. Stewart 1 Klemic, in NW NW NE 16-19n-4e, Arenac County, Michigan.

Midwest Drilling Co. is the contractor on H. Marr and associates 1 Barnett, in 9-25n-11e, just west of

UNIBOLT
THE ONE BOLT COUPLING
COMPOUND
YOUR PUMPS
. . . the convenient, economical way. Install UNIBOLT "BIG INCH" COUPLINGS with Blanking Plugs on your pump suctions.
THORNHILL-CRAVER COMPANY—HOUSTON

the town of Essex, in Stoddard County, Missouri, a rank wildcat test recently started. Midwest Drilling is reported to have contracts to drill three more tests in the area.

J. W. Lang Co. is the drilling contractor on the Michigan Devonian Petroleum and J. W. Lang Co. B-1 John J. Boeve, in SW NW NW 12-4n-15w, Allegan County, Michigan.

PENBERTHY

"REFLEX"

WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.

DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

FOR A GOOD, HONEST WATER CONDITIONING JOB . . . LARGE OR SMALL

Call JOHN FIELD-MAN ON YOUR NEXT WATER CONDITIONING JOB

LELAND HAMNER CO.

P.O. Box 1065 - Capitol 9758 - Long Distance LD 2175

2211 PRESTON AVE. HOUSTON, TEXAS

MARKET QUOTATIONS

Prices as of October 17, 1944

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.

REFINERY GASOLINE

Octane (A.S.T.M.):	76†	70-74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.825
Northeast Coast		9.075
California		6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	28-70	18-52
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.375	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.00

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity:	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.1	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended October 7, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gaso-line	Stocks: Resid-ual	Stocks: Gas oil
Appalachian	149	3,662	413	660
Ind., Ill., Ky.	780	16,629	4,061	6,963
Okla., Kan., Mo.	361	6,787	1,801	2,105
Rockies	109	1,523	662	421
Censored area*	2,280	35,373	22,670	25,237
California	827	14,370	35,227	10,992
Total 10- 7-44	4,506	78,354	64,844	46,078
Total 9-30-44	4,775	78,028	64,226	45,329
Total 10- 9-43	4,115	69,014	66,883	40,513

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
October 7, 1944	222,500,000
September 30, 1944	222,390,000
October 9, 1943	233,471,000

*Excludes unrefinable California stocks.

ROPE CONSERVATION NOTE BOOK—

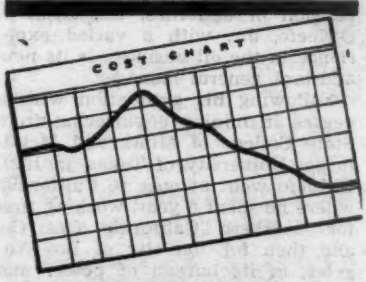
Page 8
ACIDS DESTROY ROPE
Acid will almost immediately destroy rope fibres, and the fumes are nearly as injurious as direct contact. Common acids such as uric and sulfuric are the immediate, if not always the apparent, reason for much rope trouble. Keep your rope clean and keep it away from animals, decayed matter, storage batteries and fertilizer.
For further information on treatment of rope, write for booklet, "Care and Conservation of Rope".
ACID

NEW BEDFORD CORDAGE CO.

233 BROADWAY • NEW YORK, N. Y.

Mills New Bedford Massachusetts

6302



BABBITTING COSTS CUT!

It costs less to renew babbitt bearings on pumping rigs, drilling rigs and other oil field machinery — with Babbitrite, the SAFE babbitt retainer. No blowouts, no injuries, no delays; no mixing time. Does not dry out, harden or absorb moisture. Can be re-used over 100 times.

Write for Liberal Sample.

Babbitrite

THE BABBITT RETAINER

PRODUCTS MFG. CO.

519 E. BUFFALO ST., MILWAUKEE 2, WIS.

A 4478-1/6A

PERSONALS

JOHN J. O'KEEFE, JR.

O'Keefe Takes Post With Expanding Company

INCREASES in personnel have accompanied Bel-Air Oil Co.'s expansion of activities, and John J. O'Keefe, Jr., with a varied experience in the oil business, is its new assistant general manager.

Following his graduation with a degree in mining engineering from State College of Mines and Metallurgy, University of Texas, in 1921, O'Keefe went at once to California, where he spent a year, working first for Southern California Gas Co. and then for the city of Los Angeles, in its bureau of power and light. After that he joined the geological and petroleum engineering department of Petroleum Midway Co. In 1925 he became a division petroleum engineer for Miley Oil Co. Two years later he went into business for himself in Los Angeles as a consultant. In 1932 O'Keefe became assistant to R. H. Garrison, consulting petroleum engineer. In 1934 he took the position of chief division petroleum engineer for Rio Grande Oil Co. and Richfield Oil Corp. He filled that post, working in the coast, northern, and southern divisions, until the recent appointment to his new position.

Bel-Air, whose operations O'Keefe will help supervise, has holdings in the Santa Maria area and Santa Barbara and Ventura counties, California, and in Illinois. Bel-Air is an affiliate of Bell Oil & Refining Co., which purchases most of the former's production.

Sherrill A. Shannon, on the geological staff of Cities Service Oil Co. since he graduated from Wichita University in 1937, has been named assistant district geologist in Kansas for Sunray Oil Corp., with headquarters in Wichita. **Lawrence W. Hewitt,** for the past 2½ years analyst and production expert for Petroleum Administration for War, has joined Sunray as geologist for the Gulf Coast division, with headquarters in Houston. He is a graduate of University of Nebraska.

C. D. Watson, a director of The Carter Oil Co., Tulsa, has been chosen chairman of the state board of registration for engineers, succeeding **Guy Treat,** of Oklahoma City.

G. Legh-Jones, vice president of Shell Oil Co., Inc., has left London, England, to visit the Los Angeles and San Francisco districts on company business.

Dean C. Wellman has resigned as geologist for Pure Oil Co. in Tulsa to take a similar position with Shell Oil Co., Inc., in Centralia, Ill.

Nelson E. Trumbull, of Denver, formerly petroleum engineer for The Ohio Oil Co. in West Texas and New Mexico and recently commanding an engineer aviation battalion in Italy, has been promoted from major to lieutenant colonel. Colonel Trumbull first was sent to England, where he supervised construction of the first American built runway in that country. This runway, 6,000 ft. long, was built under the handicaps of materials and equipment shortages and of frequent interruptions by German bombers. Colonel Trumbull graduated from Colorado School of Mines, where he was a tackle on the football team. He joined Ohio Oil as roustabout and scout in 1935.

W. N. Craddock, Gordon Wells and **D. N. Cook,** of the geological and engineering staff of Pacific Western Oil Co., Los Angeles, are making a tour of the Rocky Mountain district where the company is expanding its operations.

M. H. Robineau was reelected president of Frontier Refining Co. at the annual meeting in Denver. Other officers named were **H. E. Armitage, W. R. Newman** and **Dr. Ben H. Parker,** vice presidents; **D. B. Thompson,** secretary; **H. R. Heaton,** assistant secretary.

Hallam Hans Anderson, vice president and general manager of Shell Pipe Line Corp., Houston, has been appointed national vice chairman of American Petroleum Institute's committee on the standardization of oilcountry tubular goods and a member of its engineers' subcommittee. Anderson, who returns to A.P.I. standardization work after an absence of 15 years, graduated from University of Southern California in 1915.

Comdr. Wentworth H. Osgood, formerly director of Petroleum Administration for War's District 5, has been appointed commanding officer of the California Institute of Technology's V-12 naval training program. Osgood, a graduate of the Naval Academy in 1912, retired in 1932 but was called back to active duty in 1939 to head an advanced naval base at Puerto Rico. He lives in San Marino, Calif.

Lt. Cecil Hagen, who was commander of the training squadron at the U. S. Naval Air Station in Dallas, has been retired from active duty and has reopened his office in Houston as a consulting geologist.

George H. Card, formerly superintendent in the East Texas, Panhandle and Nocona district for Stanolind Oil & Gas Co., has been promoted to assistant division superintendent. **J. E. Wootton,** district superintendent in the central division in charge of Kansas, has been moved to Midland, Tex., as superintendent of the Nocona and Panhandle district, which has been enlarged to include Northwest New Mexico. **L. E. Sloan** remains in the Fort Worth office as district superintendent of West Texas. **I. L. Page,** of Longview, has been named field superintendent for East Texas. **John J. McCrea,** former division manager of the industrial relations depart-

ment, has been transferred to Tulsa as superintendent of the Oklahoma district in the central division. **R. A. Johnson** succeeds McCrea as supervisor of the industrial relations office.

Max W. Ball, Denver geologist, has been appointed special assistant to Ralph K. Davies, deputy petroleum administrator.

Homer Lynn, Dallas, in the land department of Magnolia Petroleum Co. for the past 9 years, has resigned to become an independent operator in Jackson, Miss.

Ernest L. Hughes, until recently director of marketing at Chicago for Petroleum Administration for War, has been made a special assistant to Harry F. Sinclair, president of Sinclair Oil Corp.

Dr. A. B. Bryan, chief geophysicist of The Carter Oil Co., Tulsa, left October 7 for an extended trip to South America. He will visit Ecuador, Colombia and Venezuela.

Earl B. Gilmore, Los Angeles, who recently retired as president of Gilmore Oil Co., and **Mrs. Marie De Longy** were married at Las Vegas, Nev., recently. Gilmore, who built the Gilmore stadium in Los Angeles, besides leasing the ground on which the Hollywood Baseball Park has been constructed, is president of Hollywood Turf Club, operator of the Hollywood racing plant near Inglewood, Calif.

W. E. ZIMMERMAN

William Ellis Zimmerman, since last January assistant superintendent in charge of personnel at the Marcus Hook, Pa., refinery of Sun Oil Co., has been promoted to assistant manager of the industrial relations department, in the Philadelphia office. Zimmerman joined Sun in 1937 as assistant to the manager at Marcus Hook. Before entering Sun service he served two terms as representative from Montgomery County in the Pennsylvania legislature, where he was a member of the Committee on Labor and Industry. **C. E. Chew,** personnel manager at Marcus Hook, takes Zimmerman's former position there. **H. E. Lawton,** assistant manager in the personnel division, succeeds Chew. **C. H. Abbott,** formerly office manager at the Toledo, Ohio, refinery, has been promoted to assistant manager of the refinery. **E. P. King** formerly personnel manager at Toledo, has been advanced to assistant superintendent in charge of the personnel division.

Ralph Cadenhead has been transferred by Magnolia Petroleum Co. from its East Texas drilling department to a newly created scout's position in southern Oklahoma, with headquarters in Ardmore.

A. G. Anderson has been appointed general traffic manager of Socony-Vacuum Oil Co., Inc., filling the vacancy caused by the death of L. H. Benner. Anderson has been assistant general traffic manager since 1926. For the past 2 years he has been on loan to District 1, of Petroleum Administration for War, as general manager of the supply and transportation committee.

CALENDAR

October

National Lubricating Grease Institute Edgewater Beach Hotel, Chicago, October 23, 24, 25.

PIWC, regular monthly meeting, New Interior Building, Washington, D. C., October 25.

Eighth Annual Penn State Secondary Recovery Conference, State College, Pa., October 27-28.

November

A.C.S., third national chemical exposition, Coliseum, Chicago, November 15 to 19.

VICTOR Custom FASTENINGS

for the PETROLEUM INDUSTRY

STUDS and BOLTS

Heat and corrosion resisting metals and high strength alloy steels.

Alloy steel studs and bolts for high pressure piping stocked for immediate shipment.

Let us quote on your requirements.

Write for complete catalog!
VICTOR PRODUCTS CORP
2649 Belmont Ave. • Chicago

ORBIT

DRILLING VALVES ARE QUICK-OPENING

ONLY 2½ to 5 TURNS ARE REQUIRED TO FULLY OPEN OR CLOSE THE ORBIT DRILLING VALVE. THE SEATS ARE PROTECTED AGAINST DAMAGE FROM DRILLING TOOLS AND WIRE LINES.

Orbit Flanged End Drilling Valve

ORBIT DRILLING VALVES ARE AVAILABLE IN BOTH FULL OPENING AND NOMINAL OPENING SIZES. WITH FLANGED OR SCREWED ENDS.

See pages 2194 to 2211 in 1944 Composite Catalog

ORBIT VALVES

OIL WELL IMPROVEMENTS CO.

Tulsa, Oklahoma

Industrial Items

General Controls Announce New Kansas City Branch

General Controls Co., Glendale, Calif., announce the opening of a new Kansas City branch at 421 Southwest Boulevard, Kansas City 3, Mo., with Robert Courtney in charge as branch manager.

Kobe Moves California Division Offices

The California division sales offices of Kobe, Inc., manufacturers of hydraulic oil-well pumping equipment and precision gages, were moved from the company's general offices on Slauson Avenue to 217 Wilson Building, Huntington Park, with W. F. Slater, division manager, in charge.

Edward Introduces New Steel Gate Valves; Issue New Gate-Valve Catalog

A completely new line of cast-steel gate valves, with basic improvements in design, has just been introduced by The Edward Valve & Manufacturing Co., Inc., East Chicago, Ind. Catalog 12-El includes illustrations, complete details of design, and dimensional data.

To achieve perfect alignment of all working parts, close fitting wedge guide ribs are constructed by a new method which eliminates unnecessary and wear-producing drag across seating faces.

Seat rings of the new Edward gate valves are hard surfaced and welded integrally to the body. Specially built fixtures permit hydrostatic test of both seating faces simultaneously, in contrast with the customary procedure of testing one face at a time. All gate valves 4 in. and larger are ball-bearing equipped. In the smaller sizes bearing plates for yoke bushings are EValized, a special Edward plating process, to reduce operating effort.

The new gate valves are being built in 300, 600, 900 and 1,500-lb. sp. classes and in sizes 2½ to 12 in. inclusive. They are available in some sizes and pressure classes for immediate shipment out of stock.

Cox Promoted by Caterpillar

Announcement has been made by H. H. Howard, general sales manager of Caterpillar Tractor Co., Peoria, Ill., that W. K. Cox has been advanced to the position of assistant general sales manager.

Moore Appointed by Crane Co.

Lucien W. Moore, previously general purchasing agent of Crane Co., has been appointed manager of the valve and fitting sales department, with headquarters at the Crane general offices in Chicago. Moore is succeeded as purchasing agent by Thomas J. Hanlon.

Lubricating-Oil Clarifiers Added by Briggs

The Briggs Clarifier Co. line of oil clarifiers has been further expanded by the introduction of the new DR series lubricating-oil clarifiers.

The standard DR series clarifiers have been designed to meet industry's need for an efficient, reliable line of oil filters for bypass installation. Each unit is equipped with a precision-built relief valve set to maintain the most efficient operating pressure inside the clarifier and to allow circulation through the clarifier when the oil is cold. Flow capacities range from 1 to 20 g.p.m.

The smaller models in the DR series are designed for a maximum working pressure of 100 p.s.i. and a hydrostatic test pressure of 150 p.s.i. for use with smaller-size internal-combustion engines requiring shunt-type installations. For larger-size engines where bypass installation is preferred, there are DR models with working pressures of 40 p.s.i. and hydrostatic test pressures of 60 p.s.i.

All standard D-size refill cartridges are interchangeable. The center tube of the refill assembly has been enlarged so that the refill will be properly centered on the pressure plates to assure uniform pressure over the entire end of the refill.

Porter Names Grotts To New Post

H. K. Porter Co., Inc., Pittsburgh, announces the appointment of Fred Grotts, president of its subsidiary, Fort Pitt Steel Casting Co., to a newly created position, in addition to his present one, as director of research and metallurgy for all Porter plants.

Wilson Appointed Sales Manager Farrel-Birmingham Buffalo Division

Farrel-Birmingham Co., Inc., Ansonia, Conn., and Buffalo, N. Y., announce the appointment of R. C. Wilson as sales manager of its Buffalo division, in charge of sales of gears, gear units, flexible couplings and related products. Coming to Farrel-Birmingham in 1934 as sales engineer, Wilson worked in that capacity until 1942 when he became assistant to the sales manager, which position he held until his present appointment.

Cookston Joins Weatherford Spring Co.

Harry Cookston, active for 30 years in the supply business, has been appointed assistant manager of the Weatherford Spring Co., Weatherford, Tex., under J. E. Hall, owner. Weatherford scratchers, casing guides and cement baskets, popular items with many drillers, will be Cookston's chief concern.

Eastman Opens Odessa Office

Eastman Oil Well Survey Co. announces the opening of a district office at 405 West First Street, Odessa, Tex. H. H. Benson, formerly resident engineer in Odessa, has been named district superintendent for the West Texas area.

New Pump Controller

Bowser, Inc., Fort Wayne, Ind., has announced a new pump controller especially designed for use in pumping or metering systems where liquid is delivered by gravity to an electric-motor-driven power pump. This unit automatically starts and stops the pump so that at no time will the pump be permitted to operate after liquid supply to the suction is low or exhausted. It also prevents the pump from operating should a tank car or truck be completely emptied and the pump permitted to run until the operator shuts it off. The controller is called Fig. 416, and the company has issued a bulletin describing it.

Milton Roy Pumps Appoints New Representatives

Milton Roy Pumps, 1300 East Mermaid Avenue, Philadelphia, announces the following recent appointment of new representatives: For northern New Jersey territory, W. K. Sims, 24 Commerce Street, Newark; for Cleveland and northeastern Ohio territory, George P. Schumacker, 1120 Chester Avenue, Cleveland; for Omaha, Neb., western Missouri and all of Kansas, J. J. Heinrikson, 421 B. M. A. Building, Kansas City 8, Mo.; for West Virginia territory, Charles Holz, Industrial Equipment Co., Charleston.

Trade Literature

Penn Electric Switch Co., Goshen, Ind.—A 16-page bulletin entitled "Penn Safety Controls for Engines." The bulletin is No. E-100A, and supersedes Bulletin E-100.

Drop Forging Association, 605 Hanna Building, Cleveland.—This is a 40-page booklet issued by the technical committee of the association, intended for users of forgings, instructors in engineering and metallurgy, designing engineers, metallurgists, and production and management executives. It deals broadly with characteristics of forging materials, and features steel. The booklet is illustrated with more than 200 halftones and diagrams.

Hyster Co., Portland, Ore., and Peoria, Ill.—A folder describing the company's new D4 P.C.U. auxiliary drum for the Hyster D4 towing winch. This is a friction-drive unit that combines with the winch to give complete winch and power-control service.

Western Pipe & Steel Co. of California, Box 2015-C, Terminal Annex, Los Angeles.—A new catalog covering Trumble oil and gas separation, which in 16 pages covers oil and gas separation from the early days to the present.

Automatic Sprinkler Corp. of America, Youngstown, Ohio.—An eight-page folder on the Automatic Fire-Fog system, which employs water to fight oil fires and other flammable liquid fires. The system automatically applies water in the form of a misty spray to extinguish flammable liquid fires.

Rockford Drilling Machine Division, Borg-Warner Corp., Rockford, Ill.—Three bulletins which show recent developments in the company's Pullmore multiple disk clutches.

Republic Rubber, Youngstown, Ohio, Division of Lee Rubber & Tire Corp.—A 28-page booklet on synthetic rubber and its application to mechanical rubber goods. The booklet describes the most important synthetic rubbers used by the mechanical-rubber industry and what can be expected of them.

Globe Steel Tubes Co., Milwaukee.—Bulletin 112, a 20-page booklet entitled "Bursting Pressures of Seamless Steel Tubing," which is a reference chart for engineers with tables of bursting pressures of seamless-steel tubing from ⅛-in. to 9⅝-in. o.d.